

REPORT
OF THE
MINISTER OF AGRICULTURE
FOR THE
DOMINION OF CANADA
FOR THE
YEAR ENDING MARCH 31, 1920

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

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REPORT

OF THE

MINISTER OF AGRICULTURE

1919-1920

*To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc.,
etc., Governor General and Commander in Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit to Your Excellency a report of the Department of Agriculture for the fiscal year ended March 31, 1920.

I.—GENERAL REMARKS.

The work of the department was carried out in a most efficient and satisfactory way and there will be found included herein a summary of the operations of the different branches of the department, all of which is laid before Your Excellency under their respective headings.

The legislation affecting the department during the period consisted of:—

Chapter 28, 9-10 George V, intituled, "An Act to amend the Live Stock and Live Stock Products Act of 1917." (Assented to 6th June, 1919.)

Chapter 22, 10 George V, intituled, "An Act to amend the Meat and Canned Foods Act." (Assented to 10th November, 1919.)

Chapter 24, 10 George V, intituled, "An Act to permit the temporary importation, manufacture and sale of Oleomargarine in Canada." (Assented to 10th November, 1919.)

By Order in Council approved under date the 4th April, 1919, the general regulations under "The Destructive Insect and Pest Act" approved under date the 17th of July, 1917, and amendments thereto, were further amended.

Vide "Canada Gazette," vol. LII, p. 3087.

By Order in Council approved under date the 19th April, 1919, the regulations under "The Destructive Insect and Pest Act" approved under date the 17th July, 1917, and amendments thereto, were further amended.

Vide "Canada Gazette," vol. LII, p. 3367.

By Order in Council approved under date the 19th May, 1919, the regulations under "The Destructive Insect and Pest Act" approved under date the 17th July, 1917, and amendments thereto, were further amended.

Vide "Canada Gazette," vol. LII, p. 3624.

By Order in Council approved under date the 26th May, 1919, the Order in Council approved under date the 23rd October, 1918 (P.C. 2591), *re* fibre flax seed in Canada, was rescinded.

Vide "Canada Gazette," vol. LII, p. 3825.

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By Order in Council approved under date the 10th September, 1919, the regulations made under Order in Council of date the 26th October, 1918, in virtue of the provisions of "The Seed Control Act," chapter 23, 1-2 George V, establishing standards for seed grain, and under (P.C. 1463) of July 5, 1911, defining noxious weeds and establishing germination standards, were rescinded and consolidated regulations made and enacted.

Vide "Canada Gazette," vol. LIII, p. 843.

By Order in Council under date the 20th September, 1919, in virtue of "The Animal Contagious Diseases Act," 1903—R.S.C., 1906—Regulations for the establishment and maintenance of tuberculosis-free accredited herds of cattle, were approved.

Vide "Canada Gazette," vol. LIII, p. 990.

By Order in Council approved under date the 21st November, 1919, the regulations under "The Animal Contagious Diseases Act" approved under date the 30th November, 1909, and amendments thereto, were further amended.

Vide "Canada Gazette," vol. LIII, p. 1643.

By Order in Council approved under date the 28th November, 1919, the regulations under "The Destructive Insect and Pest Act" approved on the 17th July, 1917, and amendments thereto, were further amended.

Vide "Canada Gazette," vol. LIII, p. 1702.

By Order in Council approved under date the 5th February, 1920, regulations were established in virtue of the provisions of "The Oleomargarine Act, 1919."

Vide "Canada Gazette," vol. LIII, p. 2709.

A conference of Provincial Deputy Ministers of Agriculture was held in Ottawa, March 17 to 19, 1920, with a view to enlisting greater co-operation between the federal and provincial departments, thus making the efforts of the Federal Department of Agriculture of much more benefit to the agricultural industry.

A brief summary of the proceedings of this conference will be found as an appendix hereto (see Appendix No. 1).

II.—AGRICULTURE.

DAIRY AND COLD STORAGE BRANCH

The work of this branch is carried on under the four divisions of "Dairying," "Markets," "Cold Storage," and "Inspection of Dairy Products," and these divisions will be recognized in the following summary of the work and services carried out by the branch during the year.

DAIRY DIVISION.

PRICES FOR DAIRY PRODUCTS IN 1919.

Further new records were made in 1919 in the prices received for dairy products. During the early part of the season the price of cheese rose rapidly until the maximum of 32 cents f.o.b. shipping point was paid in some cases. The price of butter reached the maximum of 67 cents during the past month. The price of cheese in the primary markets averaged about 27½ cents per pound for the season. The price of butter on the same basis was about 54 cents.

THE PROGRESS OF DAIRYING IN CANADA.

The production of milk throughout the Dominion of Canada continues to increase. An ever-increasing quantity is required for direct consumption in the growing towns and cities. Statistics show also that the per capita consumption of milk is increasing.

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During the season of 1919 a number of cheese factories were closed and the milk diverted to milk condensaries and milk powder factories. Some concern has been expressed in cheese circles regarding this diversion, but it seems to be a natural evolution in the dairying industry, and milk producers cannot be restrained from taking advantage of the best market available for their milk. The demand for condensed milk and milk powder, especially during the war period, has been very great and manufacturers of these products have been enabled to pay a large premium in excess of the returns received from the manufacture of cheese or butter.

There is some doubt as to the permanency of the increased production of condensed milk, and some apprehension is felt on the part of those interested in the cheese industry, who view with alarm what may be only a temporary closing of some of the factories. Should the demand for milk for condensing purposes fall off, the disorganization of the cheese factories which have been affected will be a rather serious matter.

The demand for milk for city consumption has induced the milk distributors to reach out into new territory for their supplies, and in some cases a sufficient amount of milk has been drawn away from cheese factories to reduce the output very considerably, thus making it difficult to conduct the factories with the remaining milk supply. One remedy for this state of affairs would seem to be to have the factories equipped in such a manner as to be in a position to sell milk or cream for market purposes when the price offered gives a better return than for the manufacture of cheese.

The total dairy production in Canada in 1919 is estimated as follows:—

	Pounds.	Value.
		\$
Cheese.....	167,107,233	45,119,000
Creamery butter.....	98,903,686	52,500,000
Dairy butter.....	125,000,000	56,250,000
Condensed milk.....	110,000,000	20,000,000
Milk powder.....	5,323,537	1,662,352
Milk powder, cream, and ice-cream.....		72,000,000
		247,531,352

The total value of all dairy products exported during the year is estimated at approximately \$65,000,000.

The production of creamery butter by provinces in 1919 is shown in the following table:—

Province.	Pounds.	Percentages.
Quebec.....	35,409,837	35.8
Ontario.....	31,900,000	32.3
Alberta.....	10,500,000	10.6
Manitoba.....	8,256,711	8.4
Saskatchewan.....	6,600,000	6.7
British Columbia.....	2,290,000	2.3
Nova Scotia.....	2,093,804	2.1
Prince Edward Island.....	937,518	0.9
New Brunswick.....	915,816	0.9
	98,903,686	100.0
Eastern Canada.....		72.1
Western Canada.....		27.9

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Ontario produced 61 per cent and Quebec 36 per cent of the cheese in 1919 the remaining 3 per cent being distributed among the other seven provinces.

The most notable feature of dairy production in Canada during recent years is the large increase in the production of condensed milk, which has grown from about 15,000,000 pounds in 1913 to 110,000,000 pounds in 1919. There has also been a large increase in the production of milk powder during the same period.

The dairying industry is developing steadily in the Prairie Provinces, especially in the manufacture of creamery butter. In 1910 the total output of creamery butter in Manitoba, Saskatchewan and Alberta was 5,478,304 pounds; in 1915, 12,872,645 pounds; and in 1919 it is estimated at 25,356,711 pounds. There is more butter manufactured to-day in the city of Edmonton, Alberta, than in any other centre in Canada, the total output in 1919 being approximately 7,000,000 pounds in four creameries, one of them being the largest in Canada.

An important development of creamery butter making is taking place in Nova Scotia. Several large creameries have recently been established, and the indications are that the manufacture of creamery butter will show very considerable increase in the coming years.

The cheesemaking industry in the province of New Brunswick has been put on a better basis by the organization of a marketing system and provision for the grading of cheese. A marked improvement was made in the quality of New Brunswick cheese during the past season, and a very much better relative price has been obtained on that account.

POLICY OF THE BRITISH MINISTRY OF FOOD.

Early in the season it was announced that the ministry would purchase no more dairy produce in Canada, and that imports would be allowed to flow through the usual channels. Following this announcement a special demand arose in the United Kingdom for limited quantities of Canadian cheese at advanced prices, and Belgium and other continental countries began to make inquiries and in some cases place definite orders for Canadian dairy products. This started speculative buying, which forced prices considerably higher than the actual market value. During the month of July the European demand suddenly collapsed, largely owing to the difficulties of finance, and at the same time the Ministry of Food announced that, effective August 8, an order would be issued requisitioning all cheese on arrival in the United Kingdom at the importers' maximum selling price of 28 cents.

This announcement, coupled with the disappointing condition of the European market, stopped buying almost instantly in Canada.

In the meantime representatives of the Butter and Cheese Committee of the British Ministry of Food came to Canada and announced that they were prepared to purchase 20,000 tons of Canadian cheese at 25 cents delivered in Montreal. This announcement caused considerable dissatisfaction. Many producers evidently looked upon the offer to purchase as a continuation of the policy which had been in force in 1917 and 1918. There was, however, this important difference, that producers were not obliged to accept this offer. Other channels for disposing of the produce were left open, and in a short time conditions on the continent improved and further sales were made to Belgium at a higher price than that offered by the committee.

The Committee did not secure the whole of the 20,000 tons until some time after the new year, when large stocks which had been purchased and held on speculative account were turned over at a heavy loss. During the past winter the British Ministry of Food has purchased Canadian cheese in Belgium at a price equivalent to 25 cents in Canada, although this same cheese was sold to

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Belgium by Canadian and American exporters at a much higher price. The ministry has also purchased on the continent Canadian and American butter for which satisfactory settlement could not be made.

MARKETS FOR CANADIAN DAIRY PRODUCE.

There is no lack of markets for Canadian dairy produce. The difficulties of finance and the loss on exchange have prevented extensive sales being made to continental Europe, but the United Kingdom is prepared to take all the dairy produce Canada may have to offer, and there is every reason to believe that prices will rule high for some time to come. It does not appear at all likely that there will be a permanent market on the continent for Canadian dairy products, but until these countries re-establish their own dairying industries the shortages resulting from the destruction of the war will be a factor in determining prices.

SCARCITY OF RENNET.

The supply of rennet, used in the manufacture of cheese, is now very nearly, if not quite, equal to all demands, and the use of pepsin is being discontinued, as cheesemakers prefer to use the rennet extract.

FINCH DAIRY STATION.

The Finch Dairy Station was established in 1912, when the premises and goodwill of two small competing cheese factories located within a mile of each other were purchased by the department and a new building erected in the village of Finch, Stormont county, Ont.

The increase in the quantity of milk as shown in the table below indicates the success of the establishment in that respect.

Year.	Milk Received.	Net Return to Patrons. Per 100 lbs.	Total Amount Distributed to Patrons.
	Lbs.	\$	\$
1912.....	2,069,281	1 11	23,304 49
1913.....	2,720,028	1 04	28,214 73
1914.....	2,356,202	1 19	28,108 74
1915.....	2,418,010	1 35	32,640 85
1916.....	2,486,380	1 60	39,779 88
1917.....	2,807,885	2 00	56,173 46
1918.....	3,859,217	2 14	82,785 69
1919.....	5,480,816	2 49	136,540 56

It will be observed that the quantity of milk was practically doubled from 1917 to 1919.

The operation of the Finch Dairy Station has demonstrated the following points:—

1. That a Government institution may be operated at a profit.
2. That it is advisable in many localities, where there is competition for the milk supply for other purposes, to have factories equipped in such a manner as to permit of the manufacture of cheese, butter, or the sale of milk and cream at a moment's notice, in order to take advantage of the best market available. In this way the patrons of the factory are not so likely to be induced to dispose of their milk through other channels.
3. That there is a large and unsatisfied demand in Canada for cheese for family use of 5 and 10-pound sizes.

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4. That the patrons of a factory appreciate good service and are willing to pay a reasonable rate for manufacturing if they get value.

5. That a large saving in fuel expense can be effected by utilizing exhaust steam for heating purposes.

6. That the operation on commercial lines of a cheese factory and creamery is a decided advantage to the Dairy Branch in its work of advising the manufacturers of butter and cheese, and outlining policies for the improvement of the manufacturing end of the dairy business.

MADAWASKA CREAMERY.

The Madawaska Creamery at St. Hilaire, N.B., was operated again during the season of 1919, on the understanding that at the end of the year it would be transferred to the provincial Department of Agriculture.

There was a very considerable increase in the cream supply, and the success of the creamery appears to be assured. It should be of great assistance to the milk producers in that part of the province, where dairying is capable of great expansion.

DOMINION EDUCATIONAL BUTTER SCORING CONTEST.

A Dominion Educational Butter Scoring Contest was carried on by the Dairy Division during the season of 1919. It was arranged to have four creameries in each province send samples of their butter to a Montreal warehouse during the first week in each month from May to October, inclusive, for the purpose of being compared and judged on the same standards. Full particulars as to conditions and methods followed in making the butter were required with each sample.

The objects of the contest were: to promote uniformity in the quality and character of Canadian butter as a whole; to discover as far as possible the best methods of handling cream and making butter, in order to produce the type most in demand in the markets at the present time; to find out if it is possible to make the highest grade of butter in all the provinces; to establish a standard type of butter, which will meet the requirements of the export trade and also be suitable for the best markets in Canada; and to promote a healthy rivalry in the different provinces in the making of finest quality butter.

The results of this contest show that the highest grade of butter can be made in every part of Canada, and that there is a very remarkable uniformity in the type and character of the best butter made in every district.

The samples of butter were retained by the department and used by the officers of the Dairy Division for demonstration purposes at the provincial dairy conventions, dairy schools, and other places during the past winter.

A full report of the contest has been prepared by the Chief of the Dairy Division as Bulletin No. 56 of the Dairy and Cold Storage Series, and is now available for distribution.

The contest will be repeated in 1920.

COW TESTING.

The Dairy Branch has for many years encouraged the keeping of records of production of individual cows, both by propaganda and active work under different plans. In 1919 one officer was employed in each province, except British Columbia, to supervise and encourage the work as much as possible. Arrangements are made with cheesemakers, buttermakers, or other persons properly equipped, to test samples of milk as brought to them by the owners of herds, and the records thus obtained are forwarded to the office at Ottawa,

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where they are compiled and reports sent to the individual owners of herds. During the year 1919 the number of records sent into the department from the different provinces was as follows:—

TOTAL NUMBER OF HERDS, COWS, TESTING CENTRES, AND BABCOCK TESTS
MADE BY PROVINCES, 1919.

Province.	Herds.	Cows.	Testing Centres.	Samples Tested.
Alberta.....	64	820	26	2,539
British Columbia.....	34	215	5	1,235
Saskatchewan.....	74	773	16	2,712
Manitoba.....	83	1,035	22	3,793
Ontario.....	417	4,214	70	18,204
Quebec.....	1,046	10,374	137	42,428
New Brunswick.....	250	1,065	18	5,144
Nova Scotia.....	207	2,714	37	12,623
Prince Edward Island.....	241	1,307	17	5,907
Totals.....	2,416	22,517	348	94,585

These figures do not by any means represent the total number of cows under test, as a large number of farmers are keeping their own records. This department supplies, free of charge, blank forms and instructions for keeping records to all farmers who apply for them.

A great many owners of herds start keeping records in the spring but fail to continue for the full lactation period. In some cases it has been found impracticable to make provision for the testing of samples during the winter months.

The next table gives the average production per cow for the herds which were tested for the full lactation period, and a comparison is made with previous years.

COMPARISON OF AVERAGE PRODUCTION BY PROVINCES FOR YEARS 1915, 1916,
AND 1919.

Province.	Average Production.					
	1915.		1916.		1919.	
	Milk.	Fat.	Milk.	Fat.	Milk.	Fat.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
British Columbia.....					6,669	262.8
Alberta.....					5,198	190.7
Saskatchewan.....	4,392	169.2	4,818	190.1	4,944	192.9
Manitoba.....					5,177	183.4
Ontario.....	6,294	217.4	6,061	212.3	6,725	243.0
Quebec.....	4,472	172.9	4,856	188.0	4,798	182.8
New Brunswick.....	4,558	183.3	4,486	181.8	5,857	235.6
Nova Scotia.....	4,909	200.7	5,083	208.0	4,962	195.5
Prince Edward Island.....	5,235	198.8	5,616	214.1	6,586	243.4
General averages.....	5,285	195.5	5,417	200.7	5,522	207.9

(The test in 1915 was 3.69, while in 1919 it was 3.7, a very slight increase.)

This table shows that from one year to another there is a gradual increase in the production of the cows recorded at the Dairy Branch. Quite a few of the herds are the same for a number of years, but there are also a great many new herds, and after a few years the cows will be practically all different. This means an increase in production from one generation to another, and is due to better breeding and feeding.

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If these figures can be taken as an indication that the production of the dairy cow is being increased from one year to another, and I think they can, it means that the value of dairy products is being added to yearly to quite an appreciable extent. For example: if every one of the 3,500,000 dairy cows in Canada had given 237 pounds more milk in 1919 than in 1915, the increase in milk production would have been over 829,000,000 pounds, valued at over \$21,000,000.

The consistent use of the scales and Babcock test to get accurate knowledge of the production of each cow, and then a wise use of this knowledge to weed out the poorer animals, and use better feeding methods, will surely pay real money by the increased production of the herd.

It has always been open to question whether this cow testing work was not more properly a provincial function. In some of the provinces at least the Departments of Agriculture would seem to have just the kind of organization best suited to give effective direction to cow testing. No official in the whole field of government aid to agriculture in Canada is in a better position to promote the keeping of dairy records than the district or county representatives. At a conference of provincial deputy ministers recently held in Ottawa the Dairy and Cold Storage Commissioner was authorized to announce that when any of the provinces were prepared to take over this work the federal department was ready to make the transfer.

MARKETS DIVISION.

MARKET REPORTING SERVICE.

A market reporting service covering butter and cheese was inaugurated and carried out during the period from May to December, inclusive. Prepaid night lettergrams were sent out twice a week to at least two leading dairy officials in each province, quoting the prices paid on the day in question for butter and cheese delivered at Montreal and Toronto. The receivers of these messages disseminated the information among the factorymen in their respective districts. On request a similar collect telegram was sent regularly direct to butter and cheese factory salesmen or managers. On Monday of each week a Dairy Produce Market Letter was issued, containing a review of the markets of Montreal, Toronto, and New York for the preceding week, with special reference to the export trade in butter and cheese. The Dairy Produce Market Letter is sent free to any person who applies for it.

DAIRY NEWS LETTER.

Another service known as the Dairy News Letter was inaugurated during the year. This letter is published on the 10th of each month. It contains extracts from the letters of correspondents in all the important dairying countries of the world, items of dairy news gleaned from journals and other publications. It also contains news respecting the activities of the branch, and other information which would not be likely to reach the public through any other channel.

The dairy officials of the Provincial Department of Agriculture were asked to co-operate in making the Dairy News Letter a success by sending once a month brief notes that would be of interest to Canadian dairymen in general. The request was well received and the information furnished by provincial dairy commissioners and other officials has appeared in the Dairy News Letter from time to time.

The market and dairy news services were carried on at small cost, and seem to be appreciated by manufacturers of and dealers in butter and cheese.

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One of the chief objects of these services, and of the Dairy News Letter especially, is to promote a more general interest in the various aspects of the dairy-ing industry, and to encourage a broader outlook on the part of those engaged in it. This seems to be advisable now that dairy produce has become an article of international commerce. The Dairy News Letter is sent free to every cheese factory and creamery in Canada, and to all other applicants.

INSPECTING HAY FOR ALBERTA.

Owing to a shortage of feed in the province of Alberta, it was considered necessary by the provincial authorities to purchase hay in Ontario and Quebec for shipment to the farmers in Alberta, and, at the request of the Minister of Agriculture for Alberta, it was agreed to provide inspection for the hay so purchased at the railway station where it was loaded. This inspection was carried on by the Markets Division, and up to the end of the fiscal year 713 carloads, aggregating 9,300 tons of hay, had been graded and inspection certificates issued therefor. By the end of April the number of cars inspected will exceed 1,000.

CARGO INSPECTION.

The usual staff of cargo inspectors was maintained during the season of navigation at the port of Montreal and the year round at the chief ports in Great Britain. An inspector was also stationed at Halifax throughout the year. These men reported the condition of perishable products as they were loaded into steamers and unloaded on the other side, and the manner in which these products were handled by the longshoremen. They also supervised the handling to as great an extent as possible, and placed self-recording thermometers, known as thermographs, in the holds of steamers along with butter, cheese, eggs, meats, fish, fruit, etc., so that records of temperature were available for each cargo. At Montreal 333 thermographs were placed in steamers sailing for Europe. Eighteen thermographs failed to register, but 315 records of temperature were obtained, as follows:—

77 in cold storage with butter, meats, poultry and fish,
30 in cooled air space with apples, eggs, meats and cheese,
208 in ordinary stowage with cheese, meats, eggs, and apples.

The Markets Division made and distributed 1,260 blue-print copies of these records. At the port of Halifax 55 thermographs were placed, practically all with apples, 330 copies of these records were made and furnished to steamship companies, fruit shippers, and others interested.

REFRIGERATOR CAR INSPECTION.

The special refrigerator car services for butter and cheese which are arranged for each year by the Markets Division were in operation from May 12 to October 4, inclusive. The inspectors at Montreal, Toronto and Halifax examined these refrigerator cars as they arrived, reported the quantity of ice in the bunkers, the sanitary condition of the car, the manner of stowage, the number of packages and weights, and the temperature of the butter as determined by actual tests with a thermometer. Daily reports were made on these cars, and any defect in the service was brought to the immediate attention of the railway company. At Montreal, during the period referred to, the inspectors reported on 1,040 cars, which contained 290,491 packages (18,800.825 pounds) of butter. The average temperature of the butter for the season, delivered by the various railroads, ranged from 51.73 to 54.30 degrees. The Montreal inspectors' reports also covered 619,631 boxes of cheese. These reports referred to the stowage of the

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boxes and to the condition of same when unloaded. When reports indicated that breakage was due to improper loading at the railway stations the facts were communicated to the railway company, and the latter reprimanded the agent at fault.

COLD STORAGE DIVISION.

THE GRIMSBY PRECOOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE.

This establishment is still operated on commercial lines, and is taxed to capacity during the fruit shipping season. The fruit-growers in the Grimsby district have become so convinced of the necessity for refrigeration in preparing tender fruits for shipment, and for holding small quantities while a carload is being accumulated, that much greater space is now required to serve the district.

It was proposed at the end of last season to remodel the establishment by substituting mechanical refrigeration for the gravity brine system with which the warehouse is now equipped. This would treble the storage space by utilizing the present ice-chamber for storage rooms, and with a greater reserve of refrigerating capacity the fruit passing through the warehouse could be cooled more rapidly, and thus add further to its capacity. Investigation, however, showed that there would be difficulty in getting the work done in time for the coming season, and also that the cost of making the alterations would be excessive at the present time.

Some experiments were conducted during the past season in the storage of grapes of different varieties and in different styles of packages. Full particulars of the tests were published in a circular (Grimsby, No. 6) issued and distributed to all grape-growers. Briefly, it was found that certain varieties of grapes, including the Agawam, Lindley, Vergennes and Black Rogers, could be preserved for the Christmas trade, and that there is a market for a considerable quantity at prices which would pay the grower a premium over the cost of storage and packing.

COLD STORAGE SUBSIDIES.

The following particulars respecting the payment of subsidies under the Cold Storage Act since its enactment in 1907 are published for general information:—

Number of warehouses erected under subsidy.....	34
Total refrigerated space.....	4,978,304 cu. ft.
Total cost.....	\$2,408,354 85
Subsidies paid.....	\$699,242.41
Instalments withheld.....	14,024.00
Instalments not yet due.....	9,240.00
Total subsidies	\$722,506.41

By an Order in Council of May 26, 1919, the payment of subsidies under the Act is limited to public cold storage warehouses erected and operated by municipal or other governing bodies.

Subsidies contracted for have all been paid in full except two, in one of which the fifth and last instalment of \$600 is due, and in the other the third, fourth and fifth instalments, amounting to \$4,320, are yet to be paid.

A complete list of all cold storage establishments in Canada has been compiled by the division, and any person may obtain a copy by applying to the Dairy and Cold Storage Commissioner.

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CREAMERY COLD STORAGE BONUSES.

This is a departmental arrangement whereby a bonus of \$100 is paid to assist creameries in erecting suitable cold storage for butter awaiting shipment. The storage must be built according to plans and specifications supplied by the department. The bonus is paid after one season's satisfactory operation. The following is the record of the year under review:—

Number of applications received in 1919-20.....	26
Number of applications refused in 1919-20.....	2
Number of applications held over to 1920-21.....	2
Number of bonuses paid 1919-20.....	22
Amount paid.....	\$2,200.00

The number of bonuses paid since this form of assistance to the creamery industry was inaugurated now amounts to 1,056, or \$96,775.25. The odd figures are accounted for by the fact that for one or two years certain bonuses were based on a percentage of the cost of the cold storage.

TERMINAL COLD STORAGE WAREHOUSE AT MONTREAL.

Largely on the representations of the Department of Agriculture, the Harbour Commissioners of Montreal have undertaken the erection of a large modern, fire-proof cold storage warehouse on the harbour front at Montreal, and construction is now under way.

This warehouse will be located on the harbour front, with trackage facilities and berths for steamers, and will provide facilities very badly needed for the export trade in meats, dairy product, and other perishable foods.

SMALL COLD STORAGES.

The Cold Storage Division receives many inquiries respecting the erection of small automatic cold storages, suitable for country homes, hotels, stores, and farmers' use. Bulletin 49 of the Dairy and Cold Storage Series contains several plans for these small cold storages in which ice only is used as a refrigerant, and also some plans of combined ice-house and dairy. These small cold storages are constructed on the principle of a house refrigerator, with an ice-chamber large enough to hold the season's supply. The bulletin referred to, together with blue-prints of the plans on a working scale, are sent to any person who applies for them.

INSPECTION OF DAIRY PRODUCTS DIVISION.

ADMINISTRATION OF THE DAIRY AND OLEOMARGARINE LAWS AND REGULATIONS THEREUNDER.

The enforcement of the laws dealing with the manufacture and sale of oleomargarine was carried on in the same manner as in previous years. Owing to the sale of oleomargarine it was necessary to increase the staff of inspectors during the year. There are now employed one chief inspector, six inspectors, and two inspectors who give part time to the work.

The following circular was issued in June last:—

“ To Manufacturers of and Dealers in Butter,—

“ In order to safeguard the reputation of Canadian butter, as well as to protect the consumer, the honest manufacturer and the honest trader, it is essential that all butter should comply with the legal standards

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and requirements. In other words butter must contain not more than sixteen per centum of water, must be of the correct weight and must be properly marked or branded. The incorporation of more than the legal maximum of water is a dishonest practice and is the more reprehensible since the ordinary consumer has no means of detecting the fraud. It is apparent that many manufacturers of butter are aiming to incorporate the full legal maximum of water, and do not allow sufficient margin for errors in sampling and testing, with the result that the butter frequently contains slightly more than sixteen per cent of water. Manufacturers of and dealers in butter which does not comply with legal requirements are liable to prosecution under the Dairy Industry Act, 1914, and regulations made thereunder, and the illegal product as well as the machinery and equipment used in manufacturing the same are liable to seizure and confiscation.

“ Regulation 16 passed under authority of the Dairy Industry Act, 1914, and which became operative on the first day of September, 1918, reads as follows:—

“ ‘Any person charged with the enforcement of this Act may with the consent of the minister,—

“ ‘(a) Seize and confiscate any apparatus or materials used or intended to be used in the manufacture of any butter, cheese or other dairy product or imitation thereof in contravention of any of the provisions of this Act or of any regulations made thereunder;

“ ‘(b) Seize and confiscate any apparatus used in the treatment of milk, butter, cheese or other dairy product when such treatment causes the said milk, butter, cheese or other dairy product to contravene any of the provisions of this Act or of any of the regulations made thereunder;

“ ‘(c) Seize and confiscate any illegal dairy product as defined in this Act.’

“ The foregoing regulation covers such violations as excess of water (over 16 per cent), short weight prints, etc.

“ In administering the Act and regulations in the past, the powers conferred by this section have not been generally employed, offenders having been usually dealt with by prosecution in court. In cases of a slight excess of water, apparently due to errors in sampling and testing, manufacturers have frequently been let off with a warning. This practice will not be continued, and in future cases of slight excess of water will be dealt with in the same manner as if the excess were due to deliberate intent to defraud. Manufacturers must allow sufficient margin to avoid danger of exceeding the limit. In order to secure a better observance of the law, the authority to seize and confiscate materials, products and apparatus will be more generally acted upon. Dealers as well as manufacturers will be held strictly accountable for any violation of the Dairy Industry Act and Regulations, and are warned that in order to avoid loss and annoyance through confiscation and prosecution all necessary precautions should be taken to assure themselves that the product meets all legal requirements.”

A copy of this circular was sent to all creameries and to the principal wholesale dealers in butter. As a result of this warning most of the wholesalers equipped themselves with moisture tests for butter, and began the testing of each lot of butter purchased. Many of the manufacturers who were incorporating excessive water in the butter were detected in this way.

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During the year, 3,226 samples of butter were tested by the inspectors for water content. The average water content of all samples tested was 14.55 per cent. Of the number tested 545 contained more than 16 per cent of water.

Comparatively few samples of oleomargarine are tested for water-content. The average water-content of oleomargarine is slightly over 12 per cent and no sample has yet been tested containing more than 16 per cent. An excess of water cannot very easily be incorporated in oleomargarine.

Following is a list of convictions secured and fines imposed, classified by provinces as well as offences:—

CONVICTIONS, YEAR ENDING MARCH 31, 1920.

Province.	Excess Water.		Short Weight.		Oleomargarine Act.	
	Number of Convictions.	Fines.	Number of Convictions.	Fines.	Number of Convictions.	Fines.
British Columbia	Nil		Nil		Nil	
Alberta..	Nil		2	\$20 00	Nil	
Saskatchewan	11	\$140 00	7	120 00	Nil	
Manitoba	14	210 00	Nil		Nil	
Ontario	18	295 00	Nil		6	\$110 00
Quebec . . .	58	1,070 00	18	310 00	5	185 00
New Brunswick	2	(Costs)	Nil		Nil	
Nova Scotia	1	10 00	Nil		Nil	
Prince Edward Island	2	40 00	Nil		Nil	
Totals. . . .	106	\$1,765 00	27	\$450 00	11	\$295 00

SUMMARY.

Offence.	Number of Convictions.	Fines.
Excess water.. . . .	106	\$1,765 00
Short weight	27	450 00
Oleomargarine Act	11	295 00
Totals.	144	\$2,510 00

During the previous fiscal year there were only 29 convictions, while fines imposed totalled \$795.

The authority to seize and confiscate goods on account of violations of the Dairy Industry Act and Regulations, as well as the Oleomargarine Act and Regulations, was first used during the past year. The confiscations made, amounts confiscated, and net proceeds realized from the sale of the same were as follows:—

BUTTER.

Offence.	Number of Confiscations.	Pounds Confiscated.	Net Proceeds.
Short weight prints.....	15	534	
Excessive water.....	4	1,472	
Total	19	2,006	\$861 46
Oleomargarine sold as butter.....	14	12,674½	\$3,761 21

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The high price of butter is no doubt responsible for the increase in the number of violations on account of excessive water in butter and short weight prints, while the wide difference between the price of oleomargarine and butter makes the practice of substituting oleomargarine for butter a very lucrative one.

PUBLICATIONS.

The publication of an annual report giving the detailed operations of this branch has been discontinued, the last report issued being for the year ending March 31, 1915. By the time an annual report is written, printed and distributed much of the information presented has become so old as to have lost very much of its value. In place of the annual report the policy now is to issue special circulars or bulletins as soon as the information is available. To some extent the Dairy News Letter, already referred to, is utilized for this purpose.

Circular No. 27, "Yield and Relative Value of Some Dairy Products," of the regular series was issued during the year.

The following special circulars, of interest to a limited number of persons only, were duplicated and distributed on special lists:—

Dairy Division—

- "Dairy" No. 1. The Manufacture of Casein.
- " No. 2. Caerphilly Cheese.

Cold Storage Division—

- "C.S." No. 1. List of Cold Storage Warehouses in Canada.
- " No. 2. List of Cold Storage Warehouses in Canada subsidized under the Cold Storage Act, 1907.
- " No. 3. The storage of Ice for Summer Use.

Grimsby Pre-Cooling and Fruit Storage Warehouse—

- "Grimsby" No. 2. The Storage of Cabbage.
- " No. 3. The Storage of Grapes.
- " No. 4. Canadian Grapes in the United Kingdom.
- " No. 5. Report for the Season of 1919.
- " No. 6. Grape Storage Tests at Grimsby.

Copies of any of these circulars may be obtained on application to the Dairy and Cold Storage Commissioner.

CORRESPONDENCE.

A large amount of correspondence on a great variety of subjects connected with the dairying industry and the transportation and storage of perishable food products is conducted by the Dairy Branch. This line of work is looked upon as a very important one, and considerable attention is paid to the collection and tabulation of information in order that inquiries may be answered promptly, and as fully as possible.

A WAR OFFICE AGENCY.

Although it was not directly connected with the Department of Agriculture, and did not involve the expenditure of Canadian money, it seems to be desirable to place on record a brief account of the important work carried out by the Dairy Branch on behalf of the Imperial War Office in the purchase and shipment of hay, oats and flour during the first three years of the great war, for the use of the expeditionary forces in France and other theatres of the war.

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Shortly after the war started the War Office requested the Canadian Government to forward supplies of hay from Canada. It was specified that the hay should be compressed into bales of special size and of great density to save space in transportation. The first order was entrusted to an experienced hay dealer, but in the course of a few weeks it was found necessary to make some change as the business had reached a state of confusion that could not be tolerated any longer. The business was turned over to this department and placed in charge of Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner, and some of his assistants.

A recompressing plant for the hay, which had already been set up in a new harbour shed at Montreal, was reorganized and enlarged, and other plants were established at different times at Charlottetown, P.E.I., Windsor, N.S., Woodstock, N.B., and at Calgary, Alta. The outputs of three single compressors, privately owned, in the province of Quebec, were also handled at times. The Montreal plant was operated night and day for many months at a capacity of 1,000 to 1,100 tons in twenty-four hours.

Later on the purchase of oats was added to the hay business. The oats were required in bags containing 80 pounds each. Bagging facilities were installed by the railway and elevator companies to meet the situation at Port McNicoll, Midland, Port Colborne, Kingston, at the four Montreal elevators, and at West St. John, N.B. The oats were purchased largely through brokers on the Winnipeg Grain Exchange, shipped in bulk to the bagging points, and then forwarded to Montreal or the winter ports for overseas shipment. Millions of bags were purchased for this purpose, for which the raw material was mostly imported from Calcutta.

In 1915 the purchase of flour was added to that of forage, and in such quantities that every mill in Canada was invited to accept contracts.

A mere statement as to the quantities and values of these articles purchased and shipped overseas through this agency will suffice to show the enormous amount of business transacted.

TOTAL VOLUME OF BUSINESS.

	Tons.	Value.
		\$
Hay	481,250	11,442,563 46
Oats.....	1,300,418	52,231,441 63
Flour	492,391	34,957,563 36
Totals.....	2,274,059	98,631,568 45

The figures given above represent 76,495,221 bushels of oats, and 12,309,776 bags of flour (80 pounds each) for which approximately 24,000,000 bushels of wheat were required.

These large transactions were carried out, as far as the management and accounting were concerned, by the regular staff of the Dairy Branch, without any outside assistance except that of a flour expert sent out by the War Office to assist in the handling of that commodity.

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A firm of chartered accountants was employed to audit these accounts of expenditures, and their final report was as follows:—

OTTAWA, April 15, 1920.

The Honourable,
The Minister of Agriculture,
Ottawa.

SIR,—We have the honour to report that, having been appointed in July, 1917, to audit, on behalf of the British War Office, the accounts of expenditures by the Department of Agriculture, through the Dairy Commissioner, for the purchase of hay, oats and flour, we have checked in detail vouchers covering all disbursements for merchandise purchased, for necessary operating supplies, and for the salaries and wages of the officials and labour employed in connection with the undertaking.

The extent of these expenditures—covering the period from October, 1914, until some months subsequent to the ending of hostilities, and involving a gross outlay of over one hundred millions of dollars—naturally necessitated a good deal of time for the audit. Interim reports, however, (the first of November, 1917), were submitted from time to time, and in connection with each report the amounts credited in the books of the commissioner as advances received were verified through correspondence with the Finance Department. We have necessarily delayed a final report and certificate until the disposal of all plants and supplies and adjustment and settlement of all outstanding accounts were completed.

The “General Statement of Disbursements and Refunds by the Department of Agriculture, to March 29, 1920, for account of the Imperial Government (War Fund Account)” —signed by the Dairy Commissioner and war fund accountant—shows net expenditures, after adding all expenses for operation and deducting all refunds, etc., as follows:—

For Flour.....	\$34,957,563 36
“ Oats.....	52,231,441 63
“ Hay.....	11,442,563 46
	<hr/>
	\$98,631,568 45

We are pleased in certifying that the above amounts correspond with the books of the war fund accountant; that vouchers for all such expenditures were produced, and that the amounts agree with the aggregate of advances by the Dominion Finance Department, as certified by the chief accountant of the latter department in a communication to us, dated the 12th of April, 1920, a copy of which is attached hereto.

We would further acknowledge that every facility was afforded us to make a thorough examination of the accounts and that all explanations required were promptly forthcoming.

In conclusion, we trust we may be permitted to express our appreciation of the very efficient and business-like manner in which this really large undertaking was entered upon and carried through to a successful termination by the Dairy Commissioner, the war fund accountant, and their staffs. The Department of Agriculture is to be congratulated in enjoying the services of officials capable, in addition to their many other routine duties, of handling successfully and economically such a large operation during the stress and strain of the war.

We have the honour to be, sir,

Your obedient servants,

Sgd. CUNNINGHAM & CO., C.A.,
Auditors.

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PURCHASE OF HAY FOR UNITED STATES GOVERNMENT.

Early in 1917 the War Office intimated that no further supplies of hay would be required from Canada, but that the compressing plant should be kept intact in case of further need.

When the United States entered the war it was suggested to the War Department at Washington that the idle hay compressing plant at Montreal might be made of service to them in securing supplies of hay for the use of the United States expeditionary force, as it was well known that no such facilities existed in the United States.

The suggestion was very readily accepted by the quartermaster-general and an agreement was entered into whereby the Department of Agriculture would purchase Canadian hay along the same lines as had been followed for the War Office, have it recompressed at Montreal and shipped to American ports as required, charging the cost price of the recompressed hay loaded on cars plus 50 cents per ton for the use of the plant at Montreal. Before the war ended the total quantity of hay supplied to the United States Government amounted to 205,744 tons, on which the charge for the use of the plant amounted to \$102,872. In this way the original cost of the plant was refunded to the War Office.

THE SEED BRANCH.

The main divisions of the Seed Branch are Seed Markets Intelligence, including production and marketing; Seed Testing; Seed Inspection and Seed Purchasing Commission.

Seed production is promoted in co-operation with the Experimental Farms Branch, the Canadian Seed Growers' Association and provincial Departments of Agriculture. The foundation stock seeds produced by plant breeders attached to Dominion or provincial experiment stations are multiplied and maintained in their purity largely by members of the Canadian Seed Growers' Association. The product is known as registered or improved seed and provides the seed stocks for field crop competitions, seed fairs and exhibitions. Field root and vegetable seed growing, which was formerly limited entirely to Europe, has been encouraged in Canada with generally satisfactory results.

Seed markets information has been supplied to both the seed growers and the seed trade. Growers have been assisted in finding markets both in Canada and abroad, and the trade has been kept in touch with sources of supply.

Seed testing continues to increase with the growing demand of farmers and gardeners to know the quality of their seeds. The control of importations and the extension of the grading system have also added very materially to the work of the seed laboratories.

Seed inspection has been extended within the year to certify as to the quality of fibre flax seed being exported to Ireland. The providing of seed grades for cereal grains and other farm seeds for the Seed Purchasing Commission, the seed trade and seed growers has made heavy demands on the Seed Inspection Division. These duties are in addition to the regular work of policing the seed trade.

The Seed Purchasing Commission has provided against seed shortage especially in the Prairie Provinces. During the past season over two million bushels of seed grain have been purchased, cleaned and distributed at cost to meet the needs of districts which had suffered from drought, frost and insect pests. At writing, practically all of the \$3,800,000 advanced for this purpose has been returned to the Receiver General, and with the disposal of surplus stocks an even balance is anticipated.

MARKETS INTELLIGENCE DIVISION.

The work of the Seed Markets Intelligence Division includes the administration of subventions on account of field crop competitions, seed fairs and provincial seed exhibitions; general encouragement to seed production; seed markets reporting and seed markets extension.

SEED PRODUCTION.

Subventions were paid to provincial Departments of Agriculture to encourage field crop competitions, local seed fairs and provincial seed exhibitions. The amounts paid the provinces approximated one-half the total cost of conducting these services. They have been the means of encouraging the more general use of good seed in Canada and have indirectly created seed supplies for commerce. Most of the provinces conducted more competitions in 1919 than in the previous year.

FIELD CROP COMPETITIONS

Subventions were paid for field crop competitions conducted in 1919, as follows:—

	Number.	Subvention paid.
		\$ cts.
Prince Edward Island.....	6	668 67
Nova Scotia.....	8	841 06
New Brunswick.....	14	899 47
Quebec.....	175	7,981 18
Ontario.....	171	13,327 33
Manitoba.....	25	2,047 08
Saskatchewan.....	17	1,311 35
Alberta.....	7	1,261 99
	423	28,338 13

The total subvention paid for field crop competitions was \$4,405.61 more than in the previous year, the general increase in the number conducted being fifty-five for the Dominion. This increase was chiefly confined to the provinces of Alberta and Quebec.

LOCAL SEED FAIRS

Local seed fairs were held during the calendar year 1919 and subventions were paid as follows:—

	Number.	Subvention paid.
		\$ cts.
Prince Edward Island.....	3	143 76
Nova Scotia.....	5	250 00
New Brunswick.....	11	516 17
Quebec...	64	3,068 83
Ontario.....	12	335 40
Manitoba.....	52	1,536 86
Saskatchewan.....	48	2,001 48
Alberta.....	14	570 67
British Columbia.....	1	50 00
	210	8,473 17

The number of seed fairs was increased by fifty-seven, principally in Manitoba and Saskatchewan. The total subvention paid was increased by approximately \$1,500.

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PROVINCIAL SEED EXHIBITIONS

Following are the provincial seed exhibitions and subventions paid thereon:

New Brunswick.....	\$366 66
Quebec.....	484 00
Ontario, Guelph	400 00
Ottawa.....	600 00
Manitoba....	600 00
Saskatchewan	343 00
	<hr/>
	\$2,793 66

Subventions paid were about \$500 less than the previous year. Alberta did not conduct an exhibition in 1919, while the three Maritime Provinces conducted an exhibition jointly at Fredericton, N.B., known as the Maritime Seed Fair.

ASSISTANCE TO CANADIAN SEED GROWERS' ASSOCIATION.

Financial support to the work of the Canadian Seed Growers' Association was continued during the year to the extent of \$7,500 from the Seed Branch appropriation. The last annual report of the association shows 412 members and 1,644 other growers engaged in the production of registered and improved seeds.

FIELD-ROOT AND VEGETABLE SEEDS

By special arrangement the subvention available to British Columbia on account of field crop competitions and seed exhibitions was devoted to encouraging the production of field root and vegetable seeds, which, because of climatic conditions, may be grown to better advantage there than elsewhere in Canada. The expenditure for this purpose was \$1,241.62, an equal amount being contributed by the provincial Department of Agriculture.

During the past year a branch office was opened in Penticton, B.C., with Mr. A. McMeans, Seed Production Specialist, in charge. Stock seeds of field-root and vegetable seeds were purchased from the Experimental Farms Branch, the Ontario Agricultural College, and private growers in Eastern Canada, and distributed at cost for commercial seed production in British Columbia. Both the rootlings and growing seed crops are inspected in the field and the threshed and recleaned seed is finally certified for market. Canadian and British seed houses have supplied seed stocks and taken growing contracts for the product. Flower seeds, especially sweet peas, are also being grown on this basis.

The production by provinces of field root and garden vegetable seeds in 1919 was as follows:—

Prince Edward Island.....	5,955 pounds
Nova Scotia.....	6,839 "
New Brunswick.....	152 "
Quebec.....	1,120 "
Ontario.....	166,760 "
British Columbia.....	150,000 "

Production in Ontario was confined chiefly to sugar-beet seed, while the Maritime Provinces and Quebec produced swede turnip seed. The seed crop of British Columbia included most of the standard varieties of field roots and garden vegetables.

SEED MARKETS REPORTING

Market circulars were compiled and issued bi-monthly during the trade season for grass and clover seeds. The information included a statement of the prospective supplies on the Canadian, United States and British markets,

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with current market values, both wholesale and retail. Canadian seed dealers, farmers' organizations and farmers received the circulars and supplied information on domestic market conditions, while the Bureau of Markets, Washington, D.C., and the Canadian Trade Commissioner, London, England, supplied information relative to seed prices, supply and demand in the United States and Great Britain respectively. This service has proven a valuable means of facilitating seed distribution to the advantage of Canadian growers and the seed trade.

SEED MARKETS EXTENSION

Effective assistance was rendered by Canadian Trade Commissioners established in seed importing countries, who supplied up-to-date lists of foreign seed houses as prospective customers for Canadian seeds. The firms whose names were obtained in this way were communicated with, their seed requirements listed and placed before Canadian exporters. This action, it is conceded, has resulted in increased export of seeds to the United States, Great Britain, France and Newfoundland. Approximately 100,000 bushels of fibre flax seed worth about a million dollars, was exported to Ireland this season. Gradually but surely the Canadian seed supply should be increased to meet the growing demand for reliable northern-grown seed.

The 1919 crop of field root and garden vegetable seeds produced in British Columbia, amounting to 150,000 pounds, was marketed through timely organization of the United Seed Growers, Limited, Penticton, B.C. The disposal of the seed was facilitated through educational and direct advertising which attracted farmers and dealers to this source of supply of commendable Canadian-grown seed.

Approximately 75,000 pounds of mangel, swede turnip and field carrot seed grown by the Experimental Farms Branch were sold at current wholesale prices to the seed trade of Canada, farmers' organizations and farmers. It was deemed advisable to confine the marketing of this seed to Canada, so that our farmers might have the great advantage of using this high-quality seed.

Circulars covering the availability and reliability of seed potato supplies in the provinces of Prince Edward Island, Nova Scotia, New Brunswick, and Quebec, were an important factor in relieving the seed potato situation in the province of Ontario, which had grave need of seed, following a poor crop last year.

HOME-GROWN VS. IMPORTED SEED

During the season of 1919, demonstrations were conducted on one hundred and seventeen farms in the provinces of Ontario and Quebec, the object being to determine the comparative values of mangel and swede turnip seed of Canadian production and seed of foreign origin. Home-grown seed was supplied the demonstrators in quantity to sow one-half an acre of each crop. They were required to sow seed of the same variety but of imported origin, and procured from ordinary trade channels. The seed from both sources was sown the same day, side by side in the same field and given identical cultural treatment. The farmers were required to report their observations and conclusions on the crop results, and their reports indicate that Canadian-grown seed gave in the majority of demonstrations superior crops, both as to quality and yields obtained.

SEED TESTING DIVISION.

The object of seed testing is to determine as much as possible about the crop that may result from the use of a given lot of seed. Crop yields are dependent to a considerable extent on soil and climatic conditions, but the

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crop cannot be good if the seed is lacking in essential qualities. Good seed must be vital and capable of producing strong, vigorous plants; it should belong to a variety suited to the conditions under which it is to be grown; it should be free from the seeds of objectionable weeds and should not contain the spores of dangerous plant diseases. Vitality, variety, purity and freedom from disease are among the qualities of seeds which can be studied by laboratory methods.

SEED LABORATORIES.

Seed laboratories are now maintained at Ottawa, Winnipeg and Calgary. The Ottawa laboratory was established in 1902 for the immediate purpose of conducting an investigation into the condition of the seed trade. The Calgary laboratory was opened in 1907, and the one at Winnipeg in 1918. The service provided by these laboratories has proven so valuable to farmers, seedsmen, and others, that new laboratories will have to be opened as soon as competent men can be secured and trained to direct them.

NATURE OF TESTS.

Samples are listed as trade, customs, official and investigation, depending on the source from which they are received and the object for which the information is required.

Trade samples are those received from farmers, merchants, and institutions such as seed growers' associations, experiment stations, agricultural colleges, agricultural offices, and similar organizations whose object is the improvement of Canadian agriculture.

Customs samples are sent by Customs officials in connection with the importation Order in Council.

Official samples are taken by seed inspectors from lots of seed suspected of being sold in violation of the Seed Control Act. Prosecutions are based on the results of the analysis of official samples.

Many lines of investigation are carried out by the laboratory as explained below and involve the making of many thousand special or investigation tests each year.

NUMBER OF TESTS MADE.

The following table indicates the number of samples of various kinds tested during the past seed testing year and also for the portion of the present seed testing season falling within the fiscal year just closed:—

—	Seed Testing Year.					
	July 1, 1918–June 30, 1919.			July 1, 1919–Mar. 31, 1920.		
	Ottawa.	Winnipeg.	Calgary.	Ottawa.	Winnipeg.	Calgary.
Trade.....	12,734	*9,219	9,596	10,852	4,349	7,881
Customs.	2,918		564	1,929	345	806
Official.....	350	1,044	474	40	26	132
Investigation....	4,697	284	946	160	530	473
Total.....	20,699	10,547	11,580	12,981	5,750	9,292

*Customs samples were included with trade samples last year at Winnipeg. The laboratory was opened on October 15, 1918, consequently only five and a half months are covered by these figures.

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INVESTIGATIONS.

Samples of wheat, oats, barley, timothy and clovers stored in the laboratory for several years have been tested for vitality each year since they were harvested. Most of the seeds in some of the samples have now lost their vitality, but in other cases the percentage of viable seeds is still quite high. The results to date have been summarized in a paper entitled "Longevity of the Seeds of Certain of our Farm Crops," prepared by Mr. H. B. Sifton, M.A., for presentation at the annual meeting of the Association of Official Seed Analysts at St. Louis, December 29 and 30, 1919. A report of another investigation was prepared for presentation at the same meeting by Mr. J. R. Dymond, M.A., under the title "Colour Characteristics of Red Clover Seed."

Mr. J. R. Fryer, M.A., of the Calgary laboratory, continued his investigation on the effect of frost on the germination and other qualities of western cereals, particularly oats. A report of his results to date was presented at a meeting held in Saskatoon of those interested in crop production in Western Canada.

Another investigation had for its object the determination of the differences in germination of timothy and clover seed samples graded No. 1, No. 2 or No. 3, on account of the general quality of the seed. Many tests were made to determine the variations occurring when different quantities are used in making purity tests, and also to determine the variations between different parts of bags, bins and other bulk lots of seed. Investigations to discover improved methods of vitality testing or to make the results of a seed test of greater value to the sender of the sample are being carried out constantly, especially during the summer and early autumn, when the routine work of the laboratories is lightest.

EDUCATIONAL WORK.

Agricultural representatives and continuation and high schools, conducting courses in weed seed identification and seed testing, have been supplied with material for illustrating the work. There is a large and steady demand for the reference collections of one hundred kinds of economic and weed seeds, formerly put up by this branch. During the war, on account of the impossibility of securing certain essential parts entering into the manufacture of the cases, the putting up of these collections was discontinued.

There is still a considerable demand for the expensive illustrated book "Farm Weeds of Canada," which has been out of print for a number of years. Bulletin S-S containing illustrations in black and white and much of the essential information contained in "Farm Weeds," has been in such demand that the edition is almost exhausted, and a revision of the material has been undertaken with the object of issuing a revised edition of this valuable publication.

FEEDING STUFFS.

Further investigations into the nature of feeding stuffs commonly sold in Canada for the purpose of feeding live stock, including poultry, have been carried out. Grain products, such as those of wheat, flax, oats, corn and barley, mixed, unmixed, or combined with other substances and offered for sale either under brand names, unnamed, or designated according to use, as, for instance, dairy feeds, poultry feeds, etc., have been examined in co-operation with the Experimental Farms Branch.

Microscopical examination of over four hundred representative samples of such feeds have shown only approximately five per cent to be entirely free from weed seeds. Ninety-three per cent of the samples contained either ground

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or whole seeds of the Mustard family. This group includes, in addition to many forms strongly suspected of being harmful, three well-established poisonous species: Wild, Tumbling, and Worm-seed Mustard, and these were found respectively in thirty, six, and two per cent of the samples. Seeds other than the Mustards, but likewise suspected of being deleterious to stock, were found in fourteen per cent of the samples. Purple Cockle and Cow Cockle, two recognized poisonous forms, were together present in eighteen per cent of the total number of feeds examined. Moreover, vital seeds of noxious weeds, mostly of a deleterious or poisonous nature, were present in twenty-nine per cent of the feeds.

FEED EXAMINATION FOR FARMERS.

Either the refusal of a feed by stock, or the harmful or fatal consequence resultant upon feeding it has caused a number of farmers to forward samples with a request for a report on the ingredients contained. Several samples have also been forwarded by various institutions which are not in a position to make the requisite examination. During the past year nearly one hundred samples, including bran and shorts, mixed feeds, condimental concentrates, gluten and molasses feeds, as well as oil cake and dairy feeds, etc., have been received from farmers. Of these fifty-nine per cent were found to contain weed seeds known to be poisonous while fifty-seven per cent also contained seeds which are classed as deleterious. For the most part, these seeds were so finely ground that they could not be detected or identified without the use of a microscope. However, in some feeds coarsely ground seeds were found and over forty-four per cent actually contained vital weed seeds of the noxious sorts. Apart from the fact that ninety per cent of these consist of harmful species from the standpoint of nutrition, there is the further danger of spreading weeds through the seeds withstanding the digestive processes. In addition to the weed and seed content of the feeds, certain deleterious fungi have been discovered in several samples. The poisonous Ergot is especially noticeable, and a species of *Aspergillus* found in a particular sample seems to have been the cause of considerable loss to one farmer.

In view of the price asked for feeds the character of the ingredients comprising them has often proved surprising. Instances might be cited of refuse screenings mixed with a little molasses, tankage and bran, selling at \$58 per ton, and of bran mixed with screenings selling at \$60. Clover screenings containing 4,560 weed seeds of one kind per ounce have been found to comprise by far the greater portion of a so-called "Stock Tonic." Oil cake meal has been found to contain a high percentage of ground cocoa shells, while bran has been brought nearer the chemical standard for shorts by the addition of linseed meal.

FEED CONTROL.

The demand for more efficient control of feeding stuffs, especially in reference to their content of vital and deleterious weed seeds, has developed very rapidly of late years, and live stock organizations have passed several resolutions in reference to this matter. The study of feed control laws and regulations and their administration in other countries has been continued. As a result of the studies and investigations carried out, the Department is now in possession of information and the nucleus of an organization for bringing the feed trade under its inspection and control.

SEED INSPECTION DIVISION.

In addition to the established work, several new lines have been organized and put into effect by the Seed Inspection Division during the past year. A

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new Order in Council under the Seed Control Act was passed on September 10 last, defining grades for seed grain, sweet clover, flax and other seeds and making provision for more effective inspection. Under the powers of this Order in Council inspection of seed oats has been conducted at shipping points on the basis of the seed grade standards, and fibre flaxseed grown in Ontario and shipped to Ireland has been inspected under guarantee of quality in accordance with No. 1 seed standard. The work previously conducted by this division and continued during the past year includes the applying of importation regulations, fixing general quality standards for the various grades of clover and grass seed, grading samples submitted to the laboratories for test, inspection of the seed trade in connection with the enforcement of the Seed Control Act and the inspection of seed grain received into and shipped from Government elevators by the Seed Purchasing Commission or other dealers.

ORDER IN COUNCIL UNDER SEED CONTROL ACT.

The new Order in Council under the Seed Control Act is based on experience in connection with the enforcement of this Act during the past ten years. The system of grading as applied to clover and timothy seeds under the Seed Control Act of 1911, has proven very satisfactory from the standpoint of both the trade and the purchasing public, and numerous requests have been received to have grades defined for other kinds of seed. During the past three seasons special seed grades have been defined by Order in Council for wheat, oats and barley. These grades have been applied principally in connection with seed grain handled by the Seed Purchasing Commission and the standards have been varied somewhat from year to year. Under the Order in Council passed September 10, 1919, standards are defined for seed wheat, oats, barley and rye, flaxseed and seed corn. Provision is also made for grading the seeds of sweet clover, white clover, grasses and millet under the regulations and grade standards defined for timothy, red clover and alfalfa seed in the Seed Control Act. The Order in Council also makes some changes in the list of weed seeds which are considered noxious under the Seed Control Act and in the percentage germination standards recognized for good seed of various kinds.

INSPECTION OF SEED OATS.

For several years there has been a demand from the trade for inspection of seed grain at shipping points. The Order in Council referred to above provides the standards and necessary authority for giving this service under approved conditions. This spring there was a shortage of seed oats in Ontario and Quebec and a surplus in Prince Edward Island. Purchasers in Ontario and Quebec were anxious to secure seed oats of defined quality and under a reliable guarantee. A seed inspector was placed at the principal elevator and shipping point in Prince Edward Island who examined the oats offered at the cleaning plants and gave an opinion on whether or not they could be cleaned for seed. The oats were cleaned under inspection and if up to the seed standard they were passed and when loaded into the car a certificate was issued to the owner which was passed on to the purchaser. Very gratifying reports have been received both by shippers and purchasers in regard to this system of inspection with the request that it be continued.

FIBRE FLAX SEED INSPECTION.

With the object of maintaining and raising the reputation of Canadian grown fibre flaxseed in the Irish market, a system of inspection was applied last season which has given very satisfactory results. Nearly all of the flax growers agreed to have their stock tested and inspected by the Seed Branch before ship-

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ping it to Ireland, provided that the bags containing the seed would be branded to indicate that the seed had been inspected and passed by an authorized Canadian Government official. It was agreed that certificates would be issued only for No. 1 Flax Seed which has a very high purity standard and a minimum germination of ninety per cent. When the growers had flaxseed ready to ship the Toronto office of the Seed Branch was notified and the inspector secured samples which were forwarded to the Ottawa laboratory for test. If the purity and germination of a sample were sufficiently high for No. 1 grade the inspector carefully examined the whole lot from which it was taken to see that it conformed with the sample tested, and if so the bags were sealed and marked "Grade No. 1" with the certificate number. A certificate in duplicate was issued to the grower for the lot, one of which was forwarded to the purchaser. This method of inspection was highly approved by the Department of Agriculture for Ireland and assisted materially in securing the market for Canadian seed.

GRADE FOR SEED CORN.

The Ontario Corn Growers' Association and individuals interested in growing and marketing seed corn in southwestern Ontario have, for several years, urged the passing of a regulation designed to give Canadian grown seed corn the benefit of distinction respecting place of growth when being marketed in competition with seed corn grown farther south. The Order in Council passed last September defines a standard for No. 1 seed corn and requires that any corn sold under this grade shall be marked to show the province or state in which it was grown.

SEED IMPORTATION REGULATIONS.

The seed importation regulations which were first applied in November, 1918, have continued in effect and have been very beneficial in preventing the importation of inferior seed. Foreign dealers now realize that they cannot ship seed of inferior quality to Canada and the tendency to use this country as a dumping ground has been checked. The regulations have been applied with very little inconvenience to the trade in securing delivery of imported stocks.

GRADING SEED SAMPLES.

The general quality standards for the various grades of clover and grass seed were fixed following a conference with a committee of the wholesale seed trade held in October. The general policy has been to make the standards conform as closely as possible to the actual seeding value of the seed. It is recognized that with clover and alfalfa seed particularly, the place of growth and strain of seed are of great importance as indicating hardiness, and the grade standards have been fixed to prevent as far as possible discriminating against homegrown seed which may not be as good in appearance as imported stock of southern origin.

The work of the inspection division includes grading all of the samples received at the laboratories for test. The grading is based on the purity analysis and germination test reports issued by the seed laboratories, combined with the general quality standards fixed by the inspection division. Samples for grading are compared with the standard samples of the grades. Samples of the standards on which the grades are based are distributed to the trade.

SEED INSPECTION.

The usual work in connection with the inspection of the trade for the enforcement of the Seed Control Act has been continued. This includes the

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occasional inspection of stock being carried by the wholesale trade and visiting retail dealers, farmers' clubs and individual farmers who are offering seed for sale. Since the Seed Control Act came into effect there has been a continuous improvement in the quality of seed supplied through the wholesale trade. This year there has been a scarcity of clover seed, but the quality in respect to purity is probably higher than ever before in so far as the seed distributed by the wholesale trade is concerned. In the seed-growing districts there is an increasing tendency for farmers and farmers' clubs to deal in seed among themselves. As a rule these clubs and individuals are not provided with efficient cleaning machinery and seed of a lower purity standard than that supplied by the wholesale trade is handled, and as a consequence there are more violations of the Seed Control Act. The trade inspection also includes paper packet seeds. The policy has been to secure a number of representative samples early in the season. These are tested for germination and the results indicate whether any particular kinds or varieties are likely to require special attention.

ELEVATOR INSPECTION.

Inspection of seed grain at the Canadian Government elevators has been continued. This service is available to all who desire to make use of it but has been taken advantage of principally by the Seed Purchasing Commission. During the past season seed inspectors have been maintained at the Government interior terminal elevators at Calgary, Moosejaw and Saskatoon. Grain which is suitable for seed when cleaned is approved by the seed inspector and separately binned. This grain when cleaned to seed standard is sacked or loaded in bulk and the inspectors issue an ex-elevator seed certificate covering each carload. All of the seed grain purchased and sold by the Seed Purchasing Commission has been handled in this way by the Seed Inspection Division. The seed grain handled by the Seed Purchasing Commission is purchased and sold without samples or guarantee except that carried by the seed inspection certificate.

THE SEED PURCHASING COMMISSION.

The Seed Purchasing Commission discontinued its activities in Eastern Canada, but because of partial crop failure in southern Alberta and southwestern Saskatchewan it was deemed advisable to continue its services for the Prairie Provinces. The constitution of the Canadian Wheat Board, which was established in July, 1919, also contemplated the continuation of the Seed Purchasing Commission, and provided for the co-operation of the two organizations in retaining and distributing in various parts of Canada such wheat as might be necessary for the 1920 seeding.

For obvious reasons the business year of the Seed Purchasing Commission cannot be conveniently brought to a conclusion until September. The balance sheet covering the three years up to September, 1919, shows an expenditure in the purchase of grain for seed of \$11,896,540.96. There has been refunded to the Receiver General, \$11,903,437.76, and in addition the commission held assets, including seed grain in storage, amounting to \$51,184.04.

What is more important, the commission has succeeded admirably during these difficult years in protecting agriculture in all parts of Canada against seed shortage of any kind of staple crop, and further, there has been general satisfaction regarding the quality of the seed purchased and distributed.

In co-operation with the Canadian Wheat Board the commission took delivery at the Canadian Government interior terminal elevators during the months of September, October, and November, of approximately one million bushels of wheat. All that was clean and otherwise suitable for seed was separately binned and retained for that purpose. Greater difficulties were

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experienced in securing an adequate supply of good seed oats and barley, but the commission succeeded in procuring over a million bushels of seed oats of good quality, which was estimated as sufficient to meet the requirements throughout the districts that suffered severely from drouth.

There has been advanced to the commission for this year's business over three and a half million dollars, and as all sales are made subject to cash payment, all of this money will be promptly returned to the Receiver General.

In the conduct of this work the department has been fortunate in having a staff of experienced men who have been able to provide a service highly acceptable to farmers and farmers' organizations, and without incurring financial loss to the Government.

LIVE STOCK BRANCH.

HORSE DIVISION.

THE HORSE INDUSTRY.

In 1914 when war broke out the horse population of Canada was approximately 3,000,000. The population for 1919 is estimated at 3,667,000, or an increase of approximately 700,000 for the five years. The great increase in numbers has taken place in the provinces of Saskatchewan and Alberta. In 1914 in these provinces there were in round numbers 610,000 and 520,000 respectively. In 1919 the numbers have increased to 1,000,000 and 800,000 respectively.

Unfortunately much of the original stock as well as the increase were the kind for which there is no demand and not likely ever to be a remunerative market. These horses are proving to be a liability rather than an asset to the country. They are consuming feed that would bring a very considerable amount of money if fed to cattle or sheep or to horses possessing size and conformation such as the market demands. The time has come when it is necessary for the horse breeders of Canada to take stock and to weed out the scrubs and culls. The country cannot afford to feed them. From now on horsemen should raise only such horses as have a place in the economic development of the country or for which a ready foreign market may be found at remunerative prices.

During the years 1914 to 1919 inclusive Canada imported all told 5,089 pure-breds; of this number 3,120 were stallions. From Great Britain came 302 stallions and 235 mares; from European countries, 45 stallions and 15 mares, and from the United States, 2,773 stallions and 1,719 mares. It will be noticed that out of the 5,089 brought into the country 4,492 were imported from the United States. Judging from the importations Canada has a great home market of her own for pure-breds required for breeding purposes.

If the 3,120 pure-bred stallions imported during the last six years were true to type, of good conformation, sound, free from hereditary disease and possessed the size required particularly in the draught breeds, they would undoubtedly do much to improve the horse stock of the country and particularly of the western provinces into which they were taken. Unfortunately, there is good reason to believe that many of these animals lacked the characteristics which would have made them good sires. In one province in 1919 in the neighbourhood of fifty (50) stallions were examined under the federal assistance policy by the Live Stock Branch. Of this number at least half had been examined and passed the year before. Of the remainder examined for the first time that year, thirteen horses were rejected for various unsoundnesses, generally with bad conformation. Of these thirteen horses twelve were imported. As clubs usually hire the best in the district it is reasonable to estimate that a very high percentage of the imported horses are inferior specimens. This is further borne out by information received from various sources concerning the horses that are standing for service in the country. Canadian breeders cannot

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afford at this time to use homebreds of poor type, much less to import poor ones for breeding purposes.

FEDERAL ASSISTANCE TO HORSE BREEDING.

During the year 1919 the policy of paying a percentage of the service fees to clubs that hired pure-bred stallions was continued. This policy is slowly but surely bringing about the results for which it was inaugurated, namely, to make the keeping of a good stallion a paying proposition to the owner and at the same time to enable clubs to obtain the services of such a stallion at a reasonable service fee. The club system is fostering community breeding. It also enables districts to stick to one breed and grade up their horse stock along definite lines.

Already in some of the districts horse sales have been held, where many of the horses offered were advertised as the colts of certain club stallions. These sales are likely to become an annual event. They will undoubtedly prove beneficial to both buyer and seller: To the buyer because he knows that he is assured of obtaining a certain number of well-bred horses of a certain size and type and to the seller through the fact that he is able to get ready sale in a co-operative way for his surplus stock, because buyers will come to the district where they are sure of getting a fair number of the class of horse required.

This policy has been the means of inducing several importers to bring in better stallions than heretofore. The careful inspection which is given all stallions hired by clubs is already proving beneficial. The weeding out of undesirables whether sound or unsound is educating the breeders to select only the best. There is also the good obtained through community breeding of a uniform type of horse. The stallion owner is also learning that the good big ones are wanted. Once the horse industry gets back to normal conditions the policy will be still more valuable and will do even more to improve the horse stock of the country.

CATTLE DIVISION.

DISTRIBUTION OF PURE-BRED BULLS.

Since 1913 the Live Stock Branch has been loaning pure-bred bulls to specially organized associations in newly settled districts and in backward sections in the older provinces. Up to the end of December, 1919, the number of bulls so loaned total 2,531.

In districts in which the department's bulls have been standing for service for several seasons, improvement in the young stock and in the stock annually marketed is to-day very noticeable. Many districts to which bulls were loaned five or six years ago have since increased their cattle holdings to such an extent that farmers have been warranted in purchasing pure-bred bulls of their own. Accordingly, each year a number of the department's sires are released by associations and are available to send on to more needy districts.

It is of interest to note that when a bull's usefulness as a sire is over he is by no means a total loss to the department. During the calendar year of 1919 the proceeds received from the sale of 426 bulls amounted to 67 per cent of their original cost as registered sires.

As a result of campaigns now under way in the different provinces to eliminate the scrub bull, it is not unlikely that the demand for the loan of bulls under the distribution policy will be greatly increased. The stimulating effect of the assistance rendered under its terms to many backward districts during the past few years justifies the belief that it may be still further extended with great profit to the cattle industry.

The following table indicates the total number of bulls purchased for each province under the distribution policy during each year of its operation, and the total cost of each year's purchases:—

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TOTAL COST OF BULLS PURCHASED.

Province in which placed.	Bought 1913.	Bought 1914.	Bought 1915.	Bought 1916.	Bought 1917.	Bought 1918.	Bought 1919.	Bought Total.
British Columbia	\$ 465-3	\$ 1,295-9	\$ 2,797-21	\$ 4,175-32	\$ 3,445-22	\$ 3,710-19	\$ 2,500-13	\$ 18,387-119
Alberta	2,430-20	10,827-78	9,917-76	11,697-81	12,675-71	14,585-67	23,170-104	85,301-497
Saskatchewan	3,988-33	14,060-116	16,050-124	10,780-76	12,265-70	8,135-43	15,755-77	81,033-539
Manitoba	3,100-27	3,280-26	3,635-28	4,965-35	6,550-37	6,160-32	7,460-35	35,150-220
Ontario	1,090-11	4,152-33	6,776-53	1,930-13	6,545-39	5,335-27	8,195-40	34,023-216
Quebec		11,742-111	19,799-170	23,512-200	21,749-165	8,335-51	10,737-62	95,874-759
New Brunswick		325-4	755-7	915-9	405-3	495-6	4,180-35	7,075-64
Nova Scotia		2,005-20	2,268-21	1,185-13	850-9	595-7	1,060-9	7,963-79
Prince Edward Island		1,535-15	1,635-17	260-3	110-1	250-2		3,790-38
	\$11,073-94	\$49,221-412	\$63,632-517	\$59,419-462	\$64,594-417	\$47,600-254	\$73,057-375	\$368,596-2,531

CARLOT POLICY.

Under the terms of the carlot policy, the Live Stock Branch pays reasonable travelling expenses of a farmer residing in Canada, or the authorized agent of farmers residing in Canada, purchasing stock at central stock yards for return to country points. In Eastern Canada assistance under the policy is confined to stock yards' purchases of female breeding stock, cattle, sheep, or hogs. In Western Canada it covers stocker and feeder cattle in addition to breeding stock.

This policy has been in effect at the stock yards in Western Canada since the fall of 1916, but on the yards at Toronto and Montreal it has been effective only since May 1, 1918. There is no question that this policy has played a very important part in encouraging the return of unfinished cattle and sheep to country points for further feeding and also in the return of young female breeding stock, particularly from yards in Western Canada. In addition it has been a very valuable educational agency in that its terms have encouraged farmers from all over the country to visit the yards and to become acquainted with methods of doing business at these points.

As the following statement indicates, over 100,000 head of cattle and over 20,000 head of sheep have been shipped back to country points under the carlot policy during the last three years:—

TOTAL CAR LOT SHIPMENTS TO DECEMBER 31, 1919.

	Steers.	Heifers.	Sheep.
1916 (3 months)...	6,208	3,113	1,407
1917.....	11,334	10,411	1,800
1918.....	20,703	18,745	7,978
1919.....	21,908	16,710	9,865
	60,153	48,979	21,050

That the policy is not an extravagant one is indicated by the fact that during the past three years the cost to the department of all cattle shipped under its terms has averaged only 59 cents per head and for all sheep only 184 cents per head.

It is estimated that at a total expenditure to date of less than \$75,000, this policy has already benefited the live stock industry to the extent of approximately \$4,000,000.

FREE FREIGHT POLICY.

The Free Freight policy which has been in operation since the fall of 1917, was inaugurated by the Live Stock Branch in co-operation with the railway companies of Canada with a view to preventing, as far as possible, the slaughter or exportation of useful heifers, young ewes, and young sows offered for sale on the open market at the central stock yards. Under this policy it has been possible to ship from the stock yards to country points female breeding stock of the classes mentioned without payment by the purchaser of freight charges on same provided the stock was not purchased for speculative purposes. While this policy has been in operation only slightly over two years, it has already had a tremendous influence on trading at the different yards. It has been very widely taken advantage of by farmers anxious to secure breeding stock and there is no question that it has been one of the most important factors in promoting the return to country points of practically all useful females offered on the yards at Edmonton, Calgary and Winnipeg during the past two years.

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Shipments under the terms of the policy from the time of its inception, September 21, 1917, to December 31, 1919, numbered as follows:—

Ex Stock Yards.	Heifers.	Ewes.	Sows.
Edmonton.	20,514	7,770	155
Calgary.....	18,761	25,348	
Winnipeg.....	17,159	7,741	195
Toronto.....	1,717	9,997	
Montreal.....	164	452	
	58,315	51,308	350

Of the above totals, shipments for the calendar year of 1919 number 25,983 heifers and 21,828 ewes.

SPECIAL RELIEF POLICY.

The serious shortage of feed existing in certain sections of the western provinces as a result of the extreme drought of the 1918 season, called for immediate assistance to needy stockmen in the dried out districts, in order to avoid the sacrifice of great numbers of live stock and the consequent enormous loss, not only to individual stock owners, but to the whole live stock industry of Western Canada. To meet this situation, what is known as the Special Relief policy was put into effect on July 23, 1918.

This policy provided for the federal department and the railway companies sharing on an equal basis the freight charges on stock shipped to feeding grounds, on haying outfits shipped to points where feed was obtainable and on feed shipments into the dry areas. The same concession applied on return shipments of stock and haying outfits. The cost of this movement to the department has amounted to approximately \$465,000.

The western provinces experienced another drouth in 1919, the feed shortage being even more acute and widespread than in 1918. A relief policy, similar to the one in force the preceding season, was accordingly put into effect, on August 2. Under this policy freight charges on haying outfits and feed have been borne on an equal basis by the federal department, the provincial departments and the railways. On shipments of stock to feeding grounds the federal and provincial departments each paid one-half of the freight, except in Saskatchewan where the freight was paid by the shipper. On return shipments of stock the railways paid fifty per cent and the federal and provincial departments each paid twenty-five per cent. On shipments over the Edmonton Dunvegan and British Columbia railway and the Alberta and Great Waterways railway, the federal and Alberta departments absorbed equally all freight on haying outfits, stock, and feed shipments.

Owing to but a limited area in Manitoba having been affected by drought, the movement in that province has been comparatively small. Western Saskatchewan, however, has taken material advantage of the policy, while in Alberta shipments authorized between August 2, 1919, and March 31, 1920, include some 175,000 tons of feed, 18,000 head of cattle and 100 carloads of haying outfits.

RECORD OF PERFORMANCE.

During the past year the most important development in connection with the Record of Performance, was the passing of resolutions at the annual meetings of the Ayrshire and Holstein-Freisian Associations that "a 305-day test with a

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calving requirement of 400 days, be added to the Record of Performance and that the calving requirement in the 365-day test be eliminated." These resolutions have been forwarded to the Live Stock Commissioner for ratification. The 305-day test should prove of great advantage to those who wish to have their cows freshen regularly each year, whereas the 365-day open test will give the exceptionally high-producing cows every opportunity to make maximum records. The standards for qualification in the 365-day test will be considerably higher than for the 305-day test, *e.g.*, the standard of qualification for a mature Holstein cow will be as follows:—

	Lbs. milk.	Lbs. fat.
305-day test	10,500	357
365-day open test	12,000	408

Although the shortage of help on dairy farms has been only slightly alleviated during the past year, and the cost of milk production has in many instances been prohibitive, the number of cows entered for the Record of Performance test was considerably higher than in any previous year. Two thousand, one hundred and ninety-two cows were entered for the test during the year 1919-20, which is five hundred and eighty-one more than the previous year.

The following is a brief summary of the work for the year:—

Number of cows entered for the test—	
Ayrshire.....	752
French-Canadian.....	30
Guernsey....	33
Holstein-Friesian ..	767
Jersey..	455
Shorthorn.....	155
Total.....	2,192
Number of cows qualified—	
Ayrshire.....	176
French-Canadian.....	8
Holstein-Friesian ..	217
Jersey...	96
Shorthorn.....	61
Total.....	558
Number of bulls qualified—	
Ayrshire.....	5
Holstein-Friesian.....	6
Jersey.....	3
Total.....	14

APPENDIX.

The records tabulated in the appendix to the annual report are for cows which have produced sufficient milk and butter fat to qualify, but which have failed to freshen within fifteen months after the commencement of the test.

Ayrshire.....	40
French Canadian.....	1
Guernsey...	3
Holstein-Friesian.....	75
Jersey.....	25
Shorthorn.....	15
Total.....	159

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POULTRY DIVISION.

The Poultry Division has endeavored to build up and organize a staff which has been and will be in a position to give to a national industry such as that of poultry rearing and the marketing of the products a supervision and an oversight comparable to that which should obtain in successful business enterprises.

In the arrangement of the work as affecting the development of the poultry industry, the idea of perfecting a business organization has been developed to the point of standardizing the product and the providing of a system of inspection by approval to insure a uniform article going forward. A comprehensive markets intelligence service has been worked out, and the mechanical part of collecting and marketing the product has been fostered through the medium of co-operative associations, through the extended instruction and demonstration in the art of candling, in the advocating of better methods of handling, more care in packing and loading, etc. The matter of economical production and costs is being approached through the policy of stock improvement, more eggs per bird, more eggs per pound of food fed, while the financial part of the programme is being followed up by a plea for greater production to make the poultry industry a real important factor in the liquidation of Canada's war debt, and the collection of statistics which will more properly correlate costs and sales prices, which accurate, definite information can be used, if necessary, as a basis for credits for the still greater expansion of the industry.

THE APPLICATION OF THE EGG REGULATIONS UNDER THE "LIVE STOCK AND LIVE STOCK PRODUCTS ACT."

The egg regulations under the "Live Stock and Live Stock Products Act" provide for the standardization of Canadian eggs and specify and define in detail the names and definitions of the various classes and grades.

Table I is a table of inspections made during the calendar year, 1919.

Table II gives a comparative summary of inspections in the western section during 1918 and 1919.

Table III is a comparative statement of export shipments by months during 1918 and 1919.

TABLE I—STATEMENT OF INSPECTIONS MADE DURING YEAR ENDING DECEMBER 31.

EASTERN SECTION.

Months.	Number inspections during month.	Number shipments not approved during month.	Number approved to date.	Number cases inspected during month.	Number cases inspected to date.
January.....	7		7	2,406	2,406
February.....					
March.....	22	1	28	7,640	10,046
April.....	29	2	55	11,141	21,187
May.....	52	5	102	23,298	44,485
June.....	34	2	134	12,418	56,903
July.....	27	1	160	9,070	65,973
August.....	32		192	9,536	75,509
September.....	94	7	279	40,019	115,528
October.....	140	12	407	59,040	174,568
November.....	110	12	505	41,757	216,325
December.....	46	2	549	13,128	229,453
	593	44	549	229,453	

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TABLE 1—STATEMENT OF INSPECTIONS MADE DURING YEAR ENDING
DECEMBER 31.

WESTERN SECTION.

Months.	Number inspections during month.	Number shipments not approved during month.	Number approved to date.	Number cases inspected during month.	Number cases inspected to date.
January.....	4	2	2	1,433	1,433
February.....					
March.....					
April.....	61		63	26,421	27,854
May.....	63	3	123	27,794	55,648
June.....	46		169	19,201	74,849
July.....	57	10	216	23,271	98,120
August.....	18	3	231	6,414	104,534
September.....	18	2	247	5,890	110,424
October.....	33	2	278	14,257	124,681
November.....	19	2	295	7,383	132,064
December.....	12	2	305	5,341	137,405
	331	26	305	137,405	

TOTALS.

January.....	11	2	9	3,839	3,839
February.....					
March.....	22	1	30	7,640	11,479
April.....	90	2	118	37,562	49,041
May.....	115	8	225	51,092	100,133
June.....	80	2	303	31,619	131,752
July.....	84	11	376	32,341	164,093
August.....	50	3	423	15,950	180,043
September.....	112	9	526	45,909	225,952
October.....	173	14	685	73,297	299,249
November.....	129	14	800	49,140	348,389
December.....	58	4	854	18,469	366,858
Total (1919).....	924	70	854	366,858	
(1918).....	416	46	370	118,595	

TABLE II—COMPARATIVE SUMMARY OF INSPECTIONS WESTERN SECTION
MANITOBA, SASKATCHEWAN AND ALBERTA.

	1918.	1919.
	June 1— Dec. 31, inclusive.	April 1— Dec. 31, inclusive.
Number cars inspected.....	173	328
Number shipped Montreal.....	73	74
Number shipped Toronto.....	43	33
Number shipped to British Columbia.....	19	91
Number exported direct.....	—	26
Number moved interprovincially between Prairie Provinces.....	26	76
Number not approved for shipment.....	12	28

The regulations became effective June 1, 1918.

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TABLE III—COMPARATIVE STATEMENT EXPORT SHIPMENTS.

Month.	1918.	1919.
March.....		7,620 cases
April.....		8,405 "
May..		18,523 "
June..		4,995 "
July.....	340 cases	4,745 "
August.....	931 "	6,421 "
September.....	269 "	33,969 "
October.....	6,151 "	57,415 "
November..	9,955 "	34,397 "
December.....	907 "	10,200 "
Total.....	18,553 cases.	186,690 cases.

Of the 186,690 cases exported, 74,376 were fresh eggs, 112,314 storage eggs. Of the fresh eggs, approximately 42 per cent were Extras, 56 per cent Firsts, 1 per cent Seconds. Of the storage eggs approximately 11 per cent were Extras, 84 per cent Firsts, and 3 per cent Seconds. Only a limited quantity of specials were exported but indications are that considerable movement of specials will take place during the ensuing year.

Owing to the fact that the railways and transportation companies insist, as required by law, that certificates of inspection be available for attachment to bills of lading, very few violations of the regulations have occurred. So far, in each instance where legal proceedings were necessary, definite convictions have been secured.

All inspection is by approval at point of shipment. This method of inspection has commended itself highly to the British importer and it is to the efficiency of the system, the methods followed, and the ability of the inspectors employed, that Canadian eggs have this year received such a distinct premium over the product of competitive countries on the British market.

At present the regulations apply mainly to export shipments. The intention is to so amend the regulations as to embrace a much larger proportion of eggs marketed within the country than is at present the case. It is also proposed to ask for the approval of regulations covering the standardization, marking and inspection of market poultry along lines similar to that followed in the egg regulations.

EGG AND POULTRY MARKETS REPORTING.

This work has advanced during the past year and what objections had been previously raised in connection with producers and shippers, in the western provinces not receiving the market information in time to be of the greatest advantage to them, have been met by the issuing of the Tri-weekly Reports from Edmonton for British Columbia and Alberta, and from Winnipeg for Manitoba and Saskatchewan.

Requests for Weekly Egg and Poultry Markets Reports are received daily, and the issuing of this report now entails the printing of over twenty thousand sheets weekly. The Daily Market Wire issued from Ottawa is also increasing in circulation, and those buyers who may still attempt to obtain supplies at prices calculated to be sufficient to meet the demands of producers ignorant of market conditions, now find they have to deal with people in possession of up-to-the-minute market information. This is resulting in placing the whole buying and selling end of the poultry industry on a fairer and more business-like basis.

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During the past year permanent correspondents have been secured in Great Britain, and at the present time the Live Stock Branch is probably the only institution in Canada receiving cable advices on egg and poultry prices in Great Britain all the year round. This cable intelligence system has been of inestimable benefit to all handlers of eggs and poultry.

At the Poultry Conference held in Ottawa March 18 and 19, the newly formed Canadian National Poultry Association passed a resolution which read in part as follows:—

Whereas the reports of egg and poultry markets at present compiled and distributed by the Live Stock Branch of the Dominion Department of Agriculture have proved to be of inestimable benefit to producing and distributing Canadian poultry interests,

Be it resolved that we express to the Live Stock Branch of the Dominion Department of Agriculture our sincere appreciation of such reports and pledge our association's co-operation in the further extension of this work.

It would seem desirable at this time to make what arrangements may be necessary to reach a greater number of those interested in the poultry industry. This would be a very difficult matter under the present system of distribution, but negotiations are now under way and it is hoped in the near future to have egg and poultry daily reports distributed to all parts of Canada through the Canadian Associated Press.

CO-OPERATIVE MARKETING AND GENERAL PROPAGANDA.

The past year has seen greater progress in co-operative marketing of eggs and poultry than any previous year. In Prince Edward Island the experimental stage and the stage of active departmental assistance has passed. The association stands on its own feet and is now a distinct, concrete demonstration of departmental activity in this connection. While general assistance in the way of encouraging more people to become co-operators is being given, departmental officers in that field are directing their work more along propagandic lines and the assisting of producers by means of better culture and improved methods to realize the financial advantages accruing through co-operative effort.

In New Brunswick and Nova Scotia the foundation is being laid. Arrangements are being made to link up co-operative sale in those provinces with the Sales Department of the Island Co-operative, and this fall a striking demonstration of the usefulness of co-operation has been brought home to producers through the medium of market poultry fairs, at one of which producers disposed of in the neighbourhood of eight (8) tons of chickens and turkeys.

A district poultry promoter has also been appointed in the province of Quebec. From reports at hand, it would appear that creameries in the province of Quebec can be utilized as a very important collecting medium, especially in those districts where egg circles are not now in existence or where the volume of product available is not sufficient to warrant the employment of a special collector. Many of the creameries in Quebec are now affiliated with one or other of the large co-operative sales organizations in Quebec.

In Ontario, after some changes and readjustments in the staff, the work has been established on a more secure footing and indications are that at an early date an important union of existing centralized bodies will take place. One co-operative body, namely, the Dundas Co-operative, shipped upwards of fifteen (15) cars of eggs for export last year. The United Farmers, Limited, of Ontario, have also arranged to include an egg and poultry department in the commercial end of their organization.

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In no province has more rapid progress in co-operative marketing occurred than in British Columbia, where during the past year a centralized association, known as the British Columbia Poultrymen's Union, has been organized and has engaged in active business operation since last July.

The following extract from a letter from the secretary of the United Farmers of Alberta pays a useful tribute to the work in Alberta:—

"The executive of the United Farmers of Alberta have instructed me to write expressing appreciation of the excellent work being done in this province by the representatives of the Dominion Poultry Branch. Having seen some of the practical work being done by the Dominion poultry representatives in Alberta, and knowing that their work is highly valued and in great demand, especially among local associations of the United Farmers of Alberta, our executive believes that no more practical work for the immediate benefit of agriculture could be done by the department than by the prompt addition of two or three more good men to the staff already employed in this province."

RECORD OF PERFORMANCE FOR POULTRY.

The Record of Performance for poultry is a policy planned to give point, direction and encouragement to the breeding of poultry along lines of greatly increased individual and flock production. This policy provides for systematic, periodic inspection of all flocks accepted for entry in the Record of Performance and provides for the issuing of a certificate of merit for each individual bird which produces 150 or more eggs in 52 consecutive weeks. Provision is also made for an advanced Record of Performance for each bird which produces 225 eggs in 52 consecutive weeks. The eggs of each bird must average 24 ounces to the dozen or over during the period of the test.

This policy was launched in July last, and the first entries received and records commenced October 1. The following table gives particulars in detail of the number of birds entered, and the districts from which they come:—

TABLE IV—PARTICULARS OF BIRDS ENTERED IN RECORD OF PERFORMANCE FOR POULTRY.

Province.	S.C.W. Leghorns.	W. Wyandottes.	B.P. Rocks.	R.I. Reds.	Other Varieties.	Total.
British Columbia.....	1,490	135	—	—	—	1,625
Prairie Provinces.....	143	5	25	40	10	223
Ontario.....	381	279	281	76	79	1,096
Quebec.....	106	—	414	219	31	770
Nova Scotia.....	6	4	—	60	—	70
New Brunswick.....	90	20	70	—	—	180
Prince Edward Island	55	74	117	—	—	246
Totals	2,271	517	907	395	120	Grand Total... 4,210

Particularly encouraging is the entry from the Maritime Provinces, where, previous to the launching of this policy, very few poultry were trap-nested except those on the Experimental Farms.

Indications are that another year, when the benefits accruing from, and the purpose of the policy, become better known, the entries will be greatly increased. At a meeting of the Canadian National Poultry Association held in Ottawa in March last, arrangements were made for incorporation of the association under the "Live Stock Pedigree Act", by which action it will be possible to

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provide for a Canadian National Poultry Record under the jurisdiction of the National Records Board. The requirements for registration are of especial interest. In addition to the ordinary requirements as to purity of breeding, it is to be required that all females must have qualified in the Record of Performance for poultry before being eligible for registration.

EXHIBITS.

As in past years the different aspects of the work carried on by the Poultry Division have been featured at every large exhibition in Canada through the medium of exhibits. The main exhibit sent out last year featured "Increased Consumption," "Canadian Standards for Eggs," "The Egg Regulations under the 'Live Stock and Live Stock Products Act'," "Co-operative Marketing," and "Flock Improvement." This exhibit toured all the larger exhibitions from coast to coast. In addition, three smaller exhibits were also kept continually moving from place to place, and these have done a very useful and necessary work. They have been favourably commented upon by exhibition authorities and by visitors at the exhibitions. As an indication of the demand there is for these exhibits, it may be pointed out that fair associations are now applying for them several months in advance. Last year it was not possible to meet all the requests made for exhibits.

MARKETS INTELLIGENCE DIVISION.

MARKETS NEWS SERVICE.—STOCK YARDS SERVICE.

Through the Markets Intelligence Division of the Live Stock Branch is administered the live stock markets policy, the objectives of which are: to remove as far as possible all conditions detrimental to the marketing of live stock as regards transportation, stock yards accommodation, and the actual transaction of business on public stock yards; to so familiarize producers and feeders of live stock with actual market conditions, and trade requirements, as to bring about more intelligent breeding and feeding in the production of market classes of live animals, and to provide a source of intelligence with regard to local, general, and world's live stock production, such as will form a sound basis for local production and give direction to general live stock development in the Dominion.

In pursuance of the policy as outlined, officers of the branch located at the central stock yards at Montreal, Toronto, Winnipeg, Calgary, and Edmonton again undertook the classifying, grading and pricing of all live stock offered for sale, obtained detailed information as to the origin and disposition of the stock and data on all other phases of trading on public stock yards, throughout the year. The information obtained by the officers was mailed or telegraphed to the Live Stock Branch at Ottawa to be recorded, co-ordinated and, in part, used as a basis of a weekly market news letter to the farm press and to a selected mailing list, the personnel of which is directly interested in the promotion of the live stock industry.

The weekly markets news service was continued and consisted of tables of statistics showing the number, average price, price range for the bulk of sales, top prices, dispositions and comparative receipts of all live stock sold on the different stock yards, together with comments in detail covering marketing conditions. In addition to supplying the reports to the regular mailing list, copies were also distributed to the members of the House of Commons. These weekly reports were again followed by monthly statistical statements.

News articles, memoranda and general information with regard to markets and the live stock industry in general, were supplied to the farm press, producers,

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trade, and officers of the Department of Agriculture; also the compilation of statistics, and the gathering of information, covering the live stock industry in the British Empire and foreign countries were continued.

A record of the point of origin of the classes and grades of live stock slaughtered, returned to country points or exported, was compiled by counties in the eastern provinces and by divisions in the western provinces, so that a very intimate knowledge as to the condition of live stock marketing in the various provinces is now available covering the period from January, 1917, to March 31, 1920.

The officers at the yards again rendered every assistance possible to purchasers of live stock under the carlot and Free Freight policies of the branch, an outline of which will be found under the report of the Cattle Division, and placed their services and offices at the disposal of all those requiring assistance in purchasing and shipping live stock.

It is conceded that the work of the officers at the yards contributed much toward the improvement of western market cattle during the past three years, as well as being instrumental in facilitating the movement of stock, particularly from the drought areas of Alberta and Saskatchewan during the fall of 1919.

NEW WORK UNDERTAKEN DURING THE YEAR.

The most important phases of the new work undertaken through the Markets Division were the inauguration of a Daily Markets Telegraph Service, an Inter-Stock Yards Telegraph Service, the distribution through the press of weekly notes on domestic and world's live stock production and the enforcement of the rules and regulations governing the operations of stock yards, as prescribed under the Live Stock and Live Stock Products Act, 1917.

The Daily Markets Telegraph Service consisted of detailed telegraph reports on the market operations at stock yards as supplied by officers of the branch, located at the yards. These reports were assembled at 11 a.m. and 4 p.m. daily, and distributed to the morning and evening press of Canada over the wires of the Canadian Press, Limited. This service is now used by practically every evening and morning paper in Canada and is recognized as standard, true, and reliable data on market transactions.

The Inter-Stock Yards Telegraph Service, inaugurated during the year, consisted of an exchange of market telegrams between officers of the branch at the various stock yards. These telegrams outlined trade conditions on the markets as soon as the day's trading was established. The telegrams when received at each yard were posted on bulletin boards so that all interested might have accurate information as to the live stock market situation at other Canadian yards, and through the intelligence obtained operate with more certainty and better direction than formerly. Daily papers printed and published at the leading live stock centres carry extensive information on the local live stock markets, and during the year officers at the yards supplied such newspapers with a large amount of special material, including the movement of stock on export and interprovincial account, from the local yards. The complete service placed live stock markets intelligence within the reach of almost every producer and feeder in the Dominion.

The Live Stock Commissioner, through the Markets Division, supplied the farm press and the regular mailing list with weekly news letters containing timely information on current conditions in domestic and foreign live stock circles.

A census of the status of the live stock industry in Canada on August 1, 1919, was made by the division through a questionnaire sent out to a list of 3,300 drovers and the information obtained therefrom made public from time to time.

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The first annual official review of the live stock market situation in Canada was prepared by the division and distributed through the farm press of Canada.

An initial move has been made to obtain better live stock railroad transportation service and the officer at Montreal has already been successful in obtaining satisfactory service for shipping points hitherto handicapped by inadequate service.

The Relief Tariff (as outlined under the report of the Cattle Division) was supervised by officers of the Markets Division, who represented the Live Stock Branch and undertook all the detail in connection with the administration of the tariff.

THE LIVE STOCK AND LIVE STOCK PRODUCTS ACT.

Under the provisions of section 9, subsections (a) and (b) of the Live Stock and Live Stock Products Act, 1917, all stock yards in Canada came under federal control during August, 1919. Since that date the construction, equipment, maintenance and operation of stock yards have been subject to the approval of the Minister of Agriculture. As required under the Act, all commission men are becoming members of a live stock exchange and are furnishing a bond as evidence of good faith. The by-laws and schedule of handling charges of the various live stock exchanges have also been submitted to the department for approval, as required.

Under the direction of the Supervisor of Stock Yards, the markets officers are charged with the work entailed in the application of the requirements under the Act. Noticeable improvements were made during the year at the various stock yards in regard to service and accommodation and there seems to exist a willingness on the part of all concerned that augurs well for the promotion of the live stock industry in this direction.

The importance of the work undertaken by the Minister of Agriculture through the Markets Intelligence Division is made manifest in the following statement:—

The live stock which came under the supervision of the officers of the branch during the year was in excess of 2,800,000 head, and was valued at over \$200,000,000.

Of the total marketings, in excess of 500,000 head of live cattle, valued at approximately \$50,000,000, were exported to United States markets, and approximately 190,000 stocker and feeder cattle were returned from Canadian stock yards to country points; the conservation of live stock as indicated by the latter movement, was effected largely through the Carlot and Free Freight policies of the department, which are administered by the Live Stock Branch through the stock yards officers.

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4.—COMPARATIVE GRADING OF LIVE STOCK WITH COMPARATIVE PERCENTAGES OF TOTAL NUMBER OF EACH CLASS MARKETED AT CANADIAN STOCKYARDS DURING CALENDAR YEARS 1918 AND 1919.

Classification.	Number 1919.	Number 1918.	Per cent. Class 1918.	Per cent. Class 1918.
Steers—Heavy finished .	22,712	21,053	2.26	2.58
Steers—1,000-1,200—				
Good.....	80,314	75,681	8.00	9.30
Common.....	20,698	30,063	2.06	3.70
Steers—700-1,000—				
Good..	69,363	70,418	6.90	8.66
Common	53,950	50,634	5.38	6.22
Heifers—				
Good .	65,283	38,489	6.50	4.73
Fair.	34,743	26,440	3.46	3.25
Common	25,719	15,351	2.56	1.90
Cows—				
Good..	77,520	75,904	7.72	9.33
Common .	109,745	85,729	10.93	10.55
Bulls—				
Good.....	9,479	8,959	0.95	1.10
Common	31,133	27,674	3.10	3.40
Canners and Cutters ..	87,028	57,095	8.67	70.2
Oxen ..	5,158	6,709	0.52	0.82
Calves—				
Veal..	226,002	178,605	90.76	93.44
Grass ..	23,015	13,532	9.24	6.56
Stockers—450-800—				
Good	93,705	98,978	9.33	12.17
Fair.....	58,855	64,675	5.86	79.5
Feeders—800-1,100—				
Good....	100,816	33,754	10.04	4.15
Fair....	57,855	25,827	5.76	3.17
Hogs (fed and watered)—				
Selects.....	729,483	803,622	87.27	86.65
Heavies.....	11,632	18,449	1.39	1.99
Lights.....	56,883	69,403	6.79	7.48
Sows....	27,726	30,458	3.32	3.29
Stags	10,216	5,532	1.23	0.59
Lambs—				
Good..	293,656	183,918	58.33	56.67
Common	72,220	52,326	14.35	16.12
Sheep—				
Heavy	4,333	5,108	0.86	1.58
Light..	81,543	46,439	16.20	14.30
Common	51,633	36,755	10.26	11.33

NOTE:—All stock included in above was sold over the scales.

SHEEP AND GOAT DIVISION.

The policy of loaning pure-bred rams and boars to farmers' live stock associations is still in operation, although during the past year it was confined to districts where it was felt that necessity warranted expenditure for this particular phase of the work. Through the introduction of sires in such districts the market value of lambs has been increased in some cases as much as fifty per cent and effective improvement in the quality of hogs has also been accomplished.

To date a total of 1,813 rams and 498 boars have been loaned under this policy; 506 rams and 89 boars are at present in service.

THE PREMIUM POLICY FOR PURE-BRED RAMS

The Premium policy for pure-bred rams was inaugurated for the first time this year and 674 applications have been received up to date. This policy is

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proving a great stimulus to the use of the pure-bred sire and has done much already to discourage the use of the scrub ram. Under this policy two annual payments of five dollars each are made to any sheep owner with a ewe flock of ten or more who purchases a pure-bred ram for the first time. The following is a statement of the applications received under this policy by provinces:

Prince Edward Island.....	44
Nova Scotia.....	50
New Brunswick.....	99
Quebec.....	283
Ontario.....	135
Manitoba.....	14
Saskatchewan.....	15
Alberta.....	27
British Columbia.....	7
Total.....	674

CO-OPERATIVE GRADING OF WOOL

During the year 3,788,138 pounds of wool were graded for farmers' co-operative organizations by graders of the Live Stock Branch. This amount includes wool from all the provinces. The grading of wool has had a wonderful effect in improving the quality and preparation of Canadian wool for market. Graded Canadian wool is now acceptable to the wool trade of Canada and a keen demand exists for our wool in the United States. As a result of grading, Canadian wools are able to compete successfully in a wider market than heretofore and Canadian sheep raisers have received the highest market price offered for the grades of wool produced. This has given greater stability to the sheep industry and accounts in a measure at least for the steady increase of the sheep population during the last few years.

The following is a statement of the grading by provinces for the year:—

WOOL GRADING STATEMENT FOR 1919.

Grades.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Fine staple....					270	520	24,320	126,447	7,651
Fine clothing					250	7,120	22,911	142,865	6,777
Fine medium staple..				164	7,126	26,465	105,347	357,158	9,493
Fine medium clothing				204	7,176	25,973	65,257	110,233	4,333
Medium staple..	16,291	66,778	24,550	79,384	207,770	64,933	235,871	361,072	19,727
Medium clothing...				7,070	17,312	22,842	50,908	60,335	8,301
Lower medium staple....	31,277	35,715	28,127	71,077	259,125	76,649	157,128	182,951	29,575
Lower medium clothing..						2,813	663	1,771	341
Low staple....	9,244	1,156	1,092	10,565	92,199	22,318	26,875	23,862	3,250
Low clothing					123	21		52	
Coarse..	5,098	735	334	6,406	118,501	6,410	8,046	12,108	137
Burly and seedy		154			13,556	7,253	21,422	12,128	1,210
Cotts..	326	437	230		23,199	4,930	1,226	3,550	1,201
Dead..		4			4,580	1,683	3,558	10,409	820
Murrain							349	1,126	
Black and gray..	645	1,500	842	1,398	3,795	4,968	3,872	8,587	407
Damaged and pulled..		171				240		280	51
Bucks								1,831	
Tags	504	1,155	638	2,413	18,659	9,427	15,120	19,467	2,724
Sweepings						280	212	1,196	
Sisal and kempy...						3,603	114	2,820	
Mohair..				151		115	218	1,358	7
Locks, pieces							54	38	
Tubwashed, washed, un- graded and miscella- neous..		1,435		99	6,738		91	20,517	168
Rejects.	271	1,137	27	8,496					
Total.....	63,656	110,377	55,840	187,427	780,379	288,563	743,562	1,462,161	96,173

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EDUCATIONAL AND DEMONSTRATIONAL PROPAGANDA WORK

During the year exhibits were sent to most of the leading exhibitions throughout Canada. The transient exhibit which visited the ten western fairs showed the grades of wool, processes of manufacture of both wool and mohair and contained a full line of shepherd's supplies as well as samples of the best feeds for sheep.

At eastern fairs the exhibits were of a very practical and demonstrational nature. Besides illustrating proper methods of sheep management and preparation of wool for market, actual demonstrations were given on shearing, preparing fleeces, grading of wool and dipping. A refrigerator displaying cuts of finished and unfinished lamb carcasses was also displayed with a view of encouraging the finishing of lambs for market.

Stationary wool exhibits have been supplied to the different agricultural colleges for use in connection with courses on wool instruction. A wool exhibit has also been placed in the Commercial and Industrial Museum, Montreal, and a large number of samples of wool grades have been sent to schools. The exhibits have been a very effective and far-reaching means of giving sheep raisers the latest knowledge on sheep raising.

Aside from exhibit work, representatives of the Sheep and Goat Division have carried on a large amount of demonstration work. Co-operative dipping has been instituted in several of the provinces, and demonstration work carried out in this connection now has as its ultimate object, where possible, the adoption of this practice. Demonstrations in the docking and castration of lambs were also concentrated in districts, where, as a result of demonstrations one or more earloads of lambs could be marketed co-operatively, thus giving farmers an opportunity to measure the value of docking and castrating in dollars and cents. As a result of such demonstrations 2,600 lambs were marketed from New Brunswick on the Montreal market at a gain of two to three cents a pound and owing to the large number of wether lambs which these shipments contained they topped the market during the weeks of their arrival on the market. During the winter urgent requests were filed from the Maritime Provinces requesting the branch to extend the activities in order that all the people might benefit. Arrangements were made to place men in the three provinces and similar work will be undertaken.

THE GOAT INDUSTRY.

Owing to repeated outbreaks of foot and mouth disease in Great Britain, it was impossible to make an importation of male goats of the milking breeds for distribution to the goat associations throughout the Dominion. Interest continues to grow in favour of the goat, especially in suburban districts, and many inquiries have come to hand asking for information of the feeding, care and management of goats. The greatest need in the goat industry at the present time is more breeding stock to meet the demands of those wishing to purchase milking does of the recognized breeds.

SWINE PROPAGANDA

In addition to the distribution of pure-bred boars under the distribution policy, a large amount of information has been disseminated in regard to the feeding and management of swine. In view of the very high price of mill feeds and rough grains and the relatively low price of pork, it has been very difficult for farmers to feed and fatten hogs at a profit, and the greatest economy in use of feeds had to be practised by utilizing all cheap by-products about the farm and exercising skill in balancing rations to obtain the best feeding results.

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FEED DIVISION

The activities of the Feed Division during the last fiscal year have been confined chiefly to the purchase and distribution of standard stock feed, 24,500 tons, 800 pounds of this product have been distributed since the inauguration of the Feed Division in 1917.

Distribution during the early part of the fiscal year was confined wholly to disposing of the balance on hand. Particulars of the distribution are shown in the attached table.

As a result of repeated requests for the department to continue to distribute standard stock feed, a conference was held in Winnipeg early in November with a view to interesting farmers' co-operative organizations in this feed and if possible to arrange for the distribution of it through that medium. As a result of this conference the eastern organizations (United Farmers of Ontario and the Comptoir Co-Operative de Montreal) contracted with the elevator companies for 3,000 tons and the department itself agreed to distribute 500 additional tons amongst the three western provinces. At the conference the attitude of the western delegates was such as to indicate that western feeders were not interested and the 500 tons mentioned were reserved more or less to take care of future demands. A further conference was held in December with a view to obtaining additional supplies but in light of the peculiar wheat situation it was felt that little or no wheat would pass through the Fort William elevators with a result that no screenings would accumulate at that point.

At the commencement of the fiscal year the division had in store in Montreal some 1,400 tons of linseed oil-cake for which no market could be found in Canada. This was disposed of to United States interests for export to Holland. It was felt that this course was to be preferred rather than continue to pay high storage charges, with little or no prospect of making sales within the Dominion.

In addition to the foregoing some 21,894 bushels and 12 pounds corn for feeding purposes have been distributed throughout the Dominion.

SCREENINGS, 1919.

Four Western Provinces.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	P.E.I.	Total.
Tonnage sold 2,772 tons, 1,860 lbs.	Tonnage sold 4,882 -1,190 lbs.	Tonnage sold 2,426 -1,790 lbs.	Tonnage 91 tons	Tonnage 206 tons	Tonnage 58 tons	Tonnage 10,437 tons, 840 lbs.
Cost \$ 102,080 01	Cost \$ 192,523 77	Cost \$ 94,299 27	Cost \$ 3,468 00	Cost \$ 8,643 00	Cost \$ 2,296 50	Cost \$ 403,310 55
Receipts \$ 73,510 48	Receipts \$ 135,212 92	Receipts \$ 68,089 27	Receipts \$ 2,450 00	Receipts \$ 6,105 00	Receipts \$ 1,675 00	Receipts \$ 287,042 67
Loss \$ 28,569 53	Loss \$ 57,310 85	Loss \$ 26,210 00	Loss \$ 1,018 00	Loss \$ 2,538 00	Loss \$ 621 50	Loss \$ 116,267 88

DOMINION EXPERIMENTAL FARMS AND STATIONS.

With the close of the war, it has been possible to discontinue some of the special lines of effort of this branch. Others have been placed upon a more far-reaching basis of research and experiment, having in view a return to the study of those principles of agriculture upon the practice of which depends the continued productivity of our soils, so vitally necessary in this period of reconstruction.

Notwithstanding many drawbacks such as depletion of staff and shortness of labour supply, the year has been one of considerable progress.

Additions have been made to several of the Branch Farms and Stations, permitting of wider experimental work.

Some much needed buildings have been erected, though in this regard much yet remains to be done before the delay in the building programme caused by the war may be said to have been overcome.

A much needed modern dairy building was commenced at the Central Farm late in the winter. This will afford space not only for the demonstration of up-to-date dairy methods but also laboratory accommodation for the study of those bacteriological problems connected with the production of pure milk.

Preparations have been made for wider work with horses, cattle and sheep, involving several new and important lines of investigation; an excellent foundation herd of pure-bred Guernseys has been established at Nappan, N.S., and the herds at Ottawa have been strengthened by the addition of some excellent Ayrshires and Holsteins. Arrangements have been made for carrying on extensive work in the breeding of French-Canadian horses at St. Joachim, Que., under the immediate supervision of the superintendent of the Cap Rouge Station; on several other Stations, east and west, breeding work with Clydes and Percherons has been commenced or widened. At Lethbridge and Lacombe, in Alberta, extensive work in sheep raising under range conditions has been put under way.

With poultry, the scope of the work has increased many fold, and it has been found possible to devote more attention to the problems underlying successful poultry keeping, such as pedigree breeding, disease investigation and the chemical researches connected with eggs, incubation, feeding, etc.

The extension work, comprising exhibits, distribution of egg and poultry account forms, inspection and survey work, etc., has been actively carried on and the egg-laying contests have increased in number from two last year to seven this year.

The Illustration Station work has been increased by the establishment of a number of new Stations in the province of Quebec and the selection of ten Stations in Nova Scotia and New Brunswick, which will be in operation in 1920.

The Division of Fibre Plants has made marked progress in demonstrating the possibilities of flax fibre production and manufacture in Canada, while the Tobacco Division, as a result of years of investigation and experiment, by means of its improved and acclimatized varieties, placed the tobacco growers in a position to profit by the high prices for tobacco which obtained this year.

The Division of Forage Plants, relieved of its emergency duty, during the war, of producing a large proportion of the root seed required in Canada, has now turned its attention to the improvement of the varieties of field-roots and to the continuation of its work in grass and clover breeding.

The Division of Horticulture, although hampered by lack of staff, has preparations well under way for wider work in the utilization of garden products by canning, drying, etc., and most of the necessary equipment therefor has been ordered.

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The Cereal Division in addition to a heavy programme of plot and breeding work has just finished a limited distribution of a new hulless oat—the Liberty—which, for special uses, bids fair to achieve popularity and success.

The plant pathologists and inspectors of the Division of Botany continued to do excellent work in the study of plant diseases, the demonstration of methods of disease prevention, especially with potatoes, inspection and certification of seed potatoes, and, in the West, especially, the study of cereal diseases.

In the other divisions, work has progressed steadily along established lines. The Division of Chemistry, which, during the war, carried a heavy burden of war work and investigation in addition to continuing in its own proper field of research as well as might be, has had to contend, both during the war and since, with shortage of staff and many changes therein. This indeed has been the case to a notable extent throughout the whole branch, and, from all indications, is likely so to continue for some time to come.

While some of the smaller fairs were not held during the past year, the Division of Extension and Publicity was kept busy, and put up excellent displays at the large exhibitions. An exhibit was also sent in charge of the chief officer of the division, to Lyons, France, and was afterwards on display for a considerable time in Paris.

It was found impossible, owing to the branch being so short-handed, to devote as great an amount of time as was desired to the preparation of material for press. However, the following publications were issued during the year:—

The Annual Report of the Experimental Farms for 1918-19.

In the Regular Series of Bulletins—

No. 93. Preservation of Fruits and Vegetables for Home use.

No. 94. Bush Fruits.

In the Second Series—

No. 40. Use of Coarse Grains as Human Food.

No. 41. Summary of 3 Years' Experiments on the Harrow Tobacco Station.

No. 42. Wild Rice.

In Pamphlets—

No. 28. The Rod Cultivator.

In Circulars—

No. 17. Every Gardener his own Seed Grower, Part II. Three issues of Seasonable Hints were also prepared and distributed and 152 articles sent to the Canadian press from April 1, 1919, to March 31, 1920.

At the close of the year, the data are complete for several excellent bulletins which it is hoped may be got ready for print during the coming year.

NOTES ON THE SEASON.

The season of 1919 opened late in both East and West. Very little seeding had been done in the East by the end of April, and in the West about forty per cent of the land remained to be sown on May 1. Growing conditions in the East, however, were favourable and fair crops resulted while in the West continued dry weather resulted in material reduction of yields, in some sections amounting to crop failure.

The average yield of wheat per acre for all Canada was ten bushels, as compared with eleven in 1918. Oats and barley also gave lower per acre returns. Hay and fodder corn and potatoes gave higher average yields than in the previous year.

At average prices, the total value of all field crops in the Dominion, in 1919, is estimated at \$1,452,437,500, as compared with a total value of \$1,372,935,970 in 1918.

The increase in acreage sown and the value of crops produced is the highest on record.

In the following tables some details will be found as to yield and value of the principal field crops in 1919. The numbers of the various classes of live stock during the period 1914-19 are also given.

AREAS AND ESTIMATES OF YIELD AND VALUE OF FIELD CROPS, 1919.

Crop.	Area.	Yield per Acre.	Total Yield.	Weight per measured bushel.	Average price per bushel.	Total Value.
	Acres	Bushels	Bushels	Lbs.	\$	\$
Fall wheat	672,793	23.75	16,006,000	61.20	1 97	31,521,000
Spring wheat	18,453,175	9.50	177,254,400	58.53	1 88	333,336,000
All wheat	19,125,968	10.00	193,260,400	59.12	1 89	364,857,000
Oats	14,952,114	26.25	394,387,000	34.16	0 80	317,097,000
Barley	2,645,509	21.25	56,389,400	46.32	1 37	77,462,700
Rye	753,081	13.50	10,207,400	55.09	1 40	14,240,000
Peas	230,351	14.75	3,406,300	59.60	2 86	9,739,300
Beans	83,577	16.50	1,388,600	59.99	4 48	6,214,800
Buckwheat.....	444,732	23.50	10,550,800	47.23	1 50	15,831,000
Mixed grains	901,612	31.00	27,851,700	44.83	1 36	37,775,400
Flax	1,093,115	5.00	5,472,800	55.14	4 13	22,609,500
Corn for husking	264,607	64.00	16,940,500		1 30	22,080,000
Potatoes	818,767	153.50	125,574,900		0 95	118,894,200
Turnips, mangels, etc	317,296	354.00	112,288,600		0 50	54,958,700
		Tons	Tons		Per ton	
Hay and clover	10,595,383	1.55	16,348,000		20.72	338,713,200
Fodder, corn	511,769	9.75	4,942,760		6 92	34,179,500
Sugar beets	24,500	9.80	240,000		10 86	2,606,000
Alfalfa.	226,869	2.20	494,200		21 85	10,800,200

NUMBER OF FARM LIVE STOCK IN THE DOMINION, 1915-1919.

Live Stock.	1915.	1916.	1917.	1918.	1919.
Horses	2,996,009	3,258,342	3,412,749	3,609,257	3,667,369
Milch cows..	2,666,846	2,833,433	3,202,283	3,538,600	3,548,437
Other cattle.....	3,399,155	3,760,718	4,718,657	6,507,267	6,536,574
Sheep	2,038,662	2,022,941	2,369,358	3,052,748	3,421,958
Swine.	3,111,900	3,474,840	3,619,382	4,289,682	4,040,070

DIVISION OF ANIMAL HUSBANDRY.

During the past fiscal year the work of the Animal Husbandry Division of the Experimental Farms has been carried on successfully. The promotion during the early part of the year of the Dominion Animal Husbandman to the position of Director of Experimental Farms has meant considerable readjustment within the division, and the ever-increasing routine work, correspondence, and travel devolving upon the junior members of the staff has necessitated the postponement of certain contemplated lines of experimental work and prevented the completion of publications in course of preparation.

LIVE STOCK AT THE CENTRAL FARM.

Horses.—The recognized excellence of the stable of horses maintained at the Central Experimental Farm has been well maintained. With the exception of those used for driving and express work, the horses are of draught type and these have been kept busily employed.

An important addition was made to the stock of registered Clydesdales by the purchase of two mares, well known in the Canadian Clydesdale show rings

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and considered by breeders as among the best individuals in America. These with the home-bred mares, stallions and colts make a most creditable showing. To assist horse-breeding operations two young stallions of excellent type and breeding, bred at the Central Farm, were shipped to Branch Farms in the Maritime Provinces.

In the first appearance of Central Experimental Farm stock in the show rings, the horse entries were singularly successful and it is safe to say that in this particular line of breeding work, this division enjoys the respect of the majority of prominent Clydesdale breeders in Canada.

Considerable success has been attained in the rearing of foals, due in part to the careful application of measures preventive of some of the serious ills incidental to foaling and the early life of the colt. As in the past, data have been collected as to costs of rearing, maintenance, the cost of horse-power, etc., both at the Central and Branch Farms.

Beef Cattle.—Owing to scarcity of roughage in the form of clover hay and ensilage and the prospective difficulty of purchasing or substituting for these feeds, in addition to the fact that other uses appeared advisable for the feeding sheds—no steer-feeding was carried on.

Dairy Cattle.—As during the previous year, four breeds of dairy cattle have been maintained, Holstein, Ayrshire, Jersey and French Canadian. Both official and semi-official test work has been carried on extensively and a large number of creditably high records made.

Besides the data accumulated on cost of rearing of animals, costs of production of milk and milk products, much testing of equipment and accessories has been carried on. At the present time nine different makes of milking machine are on hand and are being studied in so far as is possible. With the provision of facilities for bacteriological work, a long-felt want will be filled in connection with this most important line of investigation.

The increased demand for pure-bred bulls has been an encouraging sign. As in the past, many young, tested bulls have been sold at very moderate prices to private individuals and to breeding societies.

The Dairy.—From the strictly investigational or experimental standpoint, lack of accommodation has largely prevented much work being done. The definite prospect of a modern dairy building, however, would indicate future possibilities in this line. Notwithstanding interruptions in the milk supply, the gross revenue from this department has exceeded \$14,500 for the past year. Much advice has been given, both written, direct and by actual demonstration, as well as assistance to farmers and dairymen in testing milk and milk products.

Sheep.—Owing to the very limited areas of pasture available, the two flocks of sheep, consisting of Leicesters and Shropshires, have not been materially increased in number. Rather, the object has been, by selection, to improve general quality and uniformity, with the result that these two breeds are very well represented at the present time. The demand for pure-bred rams has increased to such measure, that all available stock has been distributed at normal prices.

Swine.—Putting in practice the recommendations of the times, increased production has been shown to a considerable extent in this work, as during the past three years. Owing to the rapid advance in prices of hog-feeds, however, and to the fact that the price for the finished hog has by no means kept pace with the rise in costs of production, the usual profits shown by this department have not been so much in evidence during the past year. It will be the policy materially to reduce the breeding herds to a size commensurate with facilities and space at present available.

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Two breeds are maintained, Yorkshires and Berkshires, of which large numbers of breeding pigs of all ages have been sold or sent to Branch Farms. Owing to the unsettled state of this particular line of animal industry, the demand for breeding stock has not been so keen as in years past.

Experimental work has been carried on (1) with weaning and growing pigs as to suitability of rations, methods of weaning, the use of skim-milk and substitutes, etc.; (2) with growing stock in reference to labour-saving devices; indoor, outdoor and pasture feeding, etc.; (3) with various forms of shelter for winter-fed hogs of all ages.

Feeds.—Owing to the high prices of feeds, special pains have been taken in the economical purchasing of feeds and in the testing of same. Substitutes and by-products have been used wherever the wisdom and economy of such have been indicated and efforts made to advise farmers through correspondence and the press, as to the necessity of thorough investigation of feeds before purchase.

The Health of Animals.—While recognizing the fact that none of the members of this Division has professional veterinary qualifications, more or less work on their part in connection with the health of animals is always necessary. This has involved the application of various methods of treatment for such diseases and conditions as contagious abortion, sterility and kindred ills of cattle; the prevention and treatment of navel ill in foals; testing various dips and applications for the destruction of lice and ticks on sheep; the study, in collaboration with the Health of Animals Branch, of parasitic infestations of swine and of methods of eradication and control, and of the control of parasitism generally in live stock; the testing of commercial and home-made fly repellants, etc., etc. Much useful information and data have been so accumulated during the past year.

CORRESPONDENCE, ASSISTANCE TO FARMERS, EXTENSION WORK, ETC.

There has been a considerable increase in correspondence during the past year and every effort has been made to supply full information in response to the wide range of inquiry on live stock subjects. Information concerning buildings has been in heavy demand and it would appear that, with more assistance and greater publicity, the extent of this work might be quadrupled. Over seven hundred complete sets of blue prints, with specifications in many cases, have been distributed, aside from the specific information given in correspondence.

Some really valuable extension work has been accomplished by the joint efforts of the Division of Animal Husbandry and that of Illustration Stations, consisting of a farm survey conducted in five counties in the province of Quebec. The results, so obtained, reveal facts of basic importance and will be published in bulletin form in the very near future.

ASSISTANCE TO BRANCH FARMS.

As in the past, assistance has been given to the Branch Farm system in (1) the outlining of experimental work, (2) the economical purchase of feeds, (3) the purchase of live stock, (4) the trial and adoption of labour-saving devices, (5) the planning and location of buildings. Special mention should be made of the improvement in the live stock on the Branch Farms, in which connection a large number of purchases were made this year. Although a number of buildings for various purposes have been erected during the year a number of others already planned and authorized have, of necessity, been held in abeyance.

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GENERAL.

While circumstances have necessitated that the three assistants of this Division devote much time to routine and experimental work on the Central Farm, they have judged at several of the larger exhibitions and at a large number of county fairs, and have attended demonstrations, lectures, conventions, and meetings in general in Eastern Canada, in the interests of live stock increase and betterment.

DIVISION OF FIELD HUSBANDRY.

Field investigations in soil management, crop management and agricultural engineering were continued during the past year. Soil cultural and crop rotation work is being conducted on all the branch Farms and Stations in the Prairie Provinces.

On the Eastern Canada and British Columbia Farms and Stations, rotation investigations are established and cultural work is being introduced as circumstances permit. This latter work is at the present time under way on the Experimental Farm, Charlottetown, P.E.I. No enlargement of the limited field crop investigations being conducted at the Central Farm, Ottawa, is possible since the available suitable land is fully occupied with crop rotations.

Cost of production of crops is receiving attention and observations are being made with regard to the effect which factors such as labour-saving implements and different methods of cropping and cultivation have in this connection.

FIELD CROPS AT THE CENTRAL FARM.

The crop season of 1919 was made up of extremes of cold, wet and hot weather resulting generally in poor yields of cereals and potatoes, roots and corn. The crops at the Central Farm were noticeably affected but not nearly to the extent observed on farms in the neighbourhood where no regular cropping system was followed and indifferent cultural methods practised.

The spring was unusually late, the rainfall in the months of April and May being considerably above the average, retarding seeding and planting operations. In June the weather turned very warm and dry, the drought continuing throughout the summer.

The hay crop was good, averaging on the Farm 2.57 tons per acre, corn for ensilage and oats averaged 14 tons and 52 bushels per acre respectively. Conditions for fall ploughing were very favourable, which resulted in this important work being completed before frost stopped the ploughs.

HORTICULTURAL DIVISION.

The work of the Horticultural Division is subdivided into fruit culture, vegetable culture, ornamental gardening, research, and greenhouse and canning experiments.

Among fruits the greatest attention has been paid to the apple, which is of much importance in Canada. At the Central Experimental Farm there is a large test orchard where varieties are compared and their relative merits studied. Very careful information has been disseminated throughout Canada as a result of these experiments. From time to time, during the thirty-two years in which these orchards have been established, test winters have occurred in which varieties were subjected to very severe weather conditions. The latest of these was in the winter of 1917-18 when many trees were killed. The

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effects of this winter extended into the year 1919 when more trees, weakened previously, died. While the losses have been great, the information gained will be of inestimable value to fruit-growers, as it is these winters which enable the Dominion Horticulturist to revise the lists of recommended varieties, as without sufficient hardiness all the other good points of the fruits are of little value. The crop of apples at Ottawa was a good one in 1919.

A large number of new varieties of apple have been originated in the Horticultural Division. These are being thoroughly tested on the Central and Branch Farms and by many private individuals. It is believed that a number of these will be shown to be of such value that they will before long take the place of some of the older sorts. One of the most promising of these, which fruited in 1919 at several of the Branch Farms and was favourably commented upon, is the Melba, a summer seedling of the McIntosh. Among the new sorts are others of the McIntosh type which are in season between a Melba and the McIntosh itself.

As it is believed that it is possible to obtain varieties of apples by cross-breeding which will withstand the severity of the winters of the Prairie Provinces the work begun by the late Dr. Wm. Saunders is being continued. The wild Siberian crab apple is hardy and fruits well over a large part of the prairies. Some of the first generation crosses between this and the apple are also quite hardy. Second crosses with larger fruit and more blood of the apple are now being tested. The Experimental Station at Morden, Man., is specializing in prairie horticulture, and about forty acres have been planted to fruits. Some of the varieties of apple began to fruit at this Station in 1919.

Much attention is also being paid to plums in the Horticultural Division. There is a great part of Canada where the European or *Domestica* plums do not succeed, whereas the native plum is found in very cold districts. What is being looked for, then, are improved forms of the native species. Earliness is one of the chief requisites of these plums, as the seasons in the districts where they are needed are relatively short. Some very good early ones fruited at Ottawa in 1919, and are being propagated for further test.

As the breeding of new varieties of fruits is considered to be one of the most important lines of work that the Horticultural Division can be engaged in, much work in this direction was done with strawberries, raspberries, gooseberries, and grapes in 1919. The Portia strawberry, which originated in the Horticultural Division, some years ago, was found to be the best canning berry among many tested in 1919. It is also one of the handsomest and most productive of those under test, and has been very favourably reported upon by those who have tested it elsewhere.

The other experimental work with fruits, such as methods of spraying, pruning and cultivation, was continued in 1919.

Experiments in vegetables have always been an important part of the work of the Horticultural Division. During the past thirty-three years many experiments in methods of culture have been tried and varieties tested. Pamphlets have been published in regard to the principal vegetables. The importance of using good seed potatoes has been emphasized and proven by the results of experiments carried on in the Horticultural Division. In the year 1919 the usual very striking results were obtained from seed from different sources. As examples, seed of the best Green Mountain yielded at the rate of 330 bushels per acre and one of the poorest lots only 46 bushels per acre. One seed stock of Irish Cobbler yielded at the rate of 378 bushels per acre; another at the rate of 37 bushels per acre. Experiments at the Central and Branch Farms continued to prove, in 1919, that many farmers in some parts of Canada plant potatoes too late for largest yields.

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As early vegetables are what bring the greatest profit to the growers and are among the most popular with the amateur gardener, and as many of the vegetables grown in Canada were originated in other countries where the season is longer and require more time to mature and possibly a longer period of hot weather than they get in many parts of Canada, it was felt by the Dominion Horticulturist that one of the most important lines of work to be undertaken was the development of earlier and better strains and varieties. Thus, for a long time this work has been in progress, and as a result of it some very early varieties, particularly of corn and tomatoes, have been put upon the market after being thoroughly tested by many experimenters. In 1919 one of the newest varieties of corn, called Sweet Squaw, gave a very good account of itself, particularly in Manitoba where early varieties are much sought for. Work is being continued with most of the important vegetables.

Experiments in growing seeds of the principal vegetables were continued in 1919. Much useful information, which is available to seed growers, has been obtained during the past few years in regard to distances of planting, time of maturing, yields, insects and disease, and methods of wintering biennial vegetables for seed.

During the past three seasons special attention has been paid in the Horticultural Division to canning and other methods of preserving fruits and vegetables. While the war was in progress this work was of great assistance to the many persons who were anxious to conserve food for patriotic reasons, and now when the war is over and the price of these products continues very high just as much interest is shown for personal reasons. In 1919 a bulletin was published called "Preservation of Fruits and Vegetables for Home Use," in which was published the results of the experimental work which had been carried on and recipes recommended which had proven to be the best. This bulletin has been in great demand.

At the Central Farm and at the Branch Farms and Stations attractive ornamental grounds have been developed, which must be an inspiration to improve their own places to many of the thousands of persons who visit these Farms. In connection with the ornamental grounds are experiments in growing many species and varieties of ornamental plants. Their relative hardiness, blooming season, beauty, and general merits are determined and lists of best varieties published, which are very acceptable to flower lovers. In 1919 the iris, paeony, lilac and rose collections in particular attracted much attention.

While the greenhouses at the Central Experimental Farm are not very extensive, experiments of importance to vegetable and flower growers have been carried on therein. Especial attention was paid in 1919 to cucumber, tomato, and lettuce crops. For three winters experiments with head lettuce were carried on to find if, out of the many varieties which were successfully grown in milder climates, there were any which could be grown without scalding at Ottawa. This scalding of the varieties usually grown in greenhouses in the United States had prevented Canadian greenhousemen from attempting to grow head lettuce in greenhouses in Canada. Out of a large number of varieties tested, one sort, the Early Paris, has been found to develop practically free from scald, and is recommended for growing commercially in Canada.

Among flowers, special attention has been paid to the chrysanthemum, cineraria, cyclamen, and geranium. Thousands of persons visited the greenhouses in the autumn of 1919 to see the magnificent collection of chrysanthemums under test there. Many fine new varieties of geranium have been originated in these greenhouses and have been much admired.

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THE POULTRY DIVISION.

The work of the Poultry Division has continued to grow. During the past year there were seventeen Branch Farms besides the central plant at Ottawa operating a poultry plant.

The demand for bred-to-lay cockerels from pedigree stock has been much larger than the supply. Breeding eggs are supplied in limited quantities, and more incubation space has been added to the equipment at a number of the Stations in order to supply day-old chicks to some of those who are so situated that they cannot hatch their own chicks early enough.

PEDIGREE AND BREEDING WORK.

Pedigree breeding work has been carried on on the Central Farm for years. It is intended to extend this work gradually until it is conducted on every Farm of the entire system. The ultimate aim is to produce heavy laying strains from the leading varieties of fowl, always keeping in mind standard qualities.

While progress is of necessity slow, considerable advancement is being made. For instance, there was a strong feeling that high egg-laying records could not be made in the Prairie Provinces owing to the severity of the weather. It has been demonstrated that this is not so. At the Indian Head Farm some good records have been made. One White Wyandotte pullet, "Prairie Queen," laid 259 eggs in a year. At the Lethbridge Farm also where Barred Plymouth Rocks are kept, there have been very high averages made.

The most noteworthy pedigreed records to date are those at the Experimental Station at Sidney, Vancouver island, the White Wyandotte "Island Queen," with a record of 261 eggs in her pullet year, has produced six daughters that have given good records. "Island Princess," 274 eggs; "Princess Victoria," 300 eggs; "Princess Royal," 291 eggs; "Princess Ena," 243 eggs; "Princess Alice," 201 eggs; and "Princess May," 214 eggs—an average production for the six sisters of 254 eggs.

DISEASE INVESTIGATION.

The work undertaken by Dr. A. B. Wickware in relation to poultry diseases is progressing favourably. Experiments are being conducted on avian tuberculosis, to determine, if possible, its exact relation to the types of disease to be found in the domesticated animals.

The life history of certain parasites and mites such as those causing scaly leg is being worked out.

Experiments are also being conducted on chicken-pox to determine the efficiency of different vaccines in the treatment and prevention of pox, canker, roup, etc.

A collection of internal worms such as tape-worms, round worms, etc., is being made to determine those commonly found in Canada and the type peculiar to each locality.

CHEMICAL INVESTIGATION.

Incubation.—Considerable work has been done during the year on artificial incubation, and the results obtained from the investigation and the study of the work of previous investigators and from the experience of the average poultryman showed quite clearly that there was a great need for further work on this subject. To that end, an experimental incubator was designed and built.

Eggs.—A start was made on the study of the physical and chemical characteristics of eggs. Barred Plymouth Rocks, White Leghorn, and White Wyandotte

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eggs were analyzed to determine if there is any chemical, and hence nutritional, difference in the eggs of the different breeds. The results showed little or no difference. It seems quite probable that there is as much difference in eggs from individual hens of the same breed as in the average of a number of eggs from hens of different breeds.

Chick Feeding.—During the months of July and August some experimental work in chick feeding was carried on. A study from the results of different pens showed that eggs, meat meal and greens are essential for proper vitality and development and, of these, eggs played a very prominent part.

Further chemical research work is being conducted on incubation, brooding, feeds, nutrition, the value of eggs and poultry in the diet, etc., the results of which will be reported as the work progresses.

EXTENSION WORK.

Under this head comes such work as "exhibitions," "the farm egg and poultry account," "survey work," "judging," "institute work," and the work conducted by the poultry inspector for the Maritime Provinces.

Exhibitions.—During the year the Poultry Division has contributed to all the exhibits made by the Extension and Publicity Division throughout the Dominion, and in addition to this, a special poultry exhibit covered a circuit of eleven fairs in Ontario during November, December and January.

Farm Egg and Poultry Account.—This is a simple form for the purpose of supplying a convenient method of keeping accounts in the poultry plant.

The advantage is mutual. Better methods have been adopted. Figures as to profit and loss are available. The division obtained a good deal of useful information as to market, feeds generally available, prices, and the outlook in the locality for the poultry industry. In return the farmer received the free blank forms, seasonable advice and replies to questions on feed and management.

Survey work.—The work started in Quebec from the Experimental Farms has been continued and in addition to this the officer in charge has acted as inspector over similar work conducted at four centres by the Quebec Provincial Department, which inspection requires a visit to 115 competitors once every three months. He has also attended a large number of institute meetings, has assisted at the short courses conducted in that province and, during the season, judged poultry at a number of fairs.

Inspection.—Something similar to the survey work conducted among the farmers surrounding the Experimental Stations in Quebec was this year started in the Maritime Provinces.

In addition to the survey work from the Experimental Farms, is included the giving of assistance and advice to the poultrymen in charge of the work at the Farms, demonstration and lectures, speaking at institute meetings, judging and demonstrating at fairs, and the inspection of the laying contests conducted by the Experimental Farms at Charlottetown, Nappan and Cap Rouge, and the contest at Truro under the management of the provincial department of Nova Scotia.

EGG LAYING CONTESTS AND RECORD OF PERFORMANCE.

The establishment of a Record of Performance for poultry which was instituted from the first of November, 1919, marks an advance step in poultry keeping. At the present time, Record of Performance is divided into two sections, Section A and Section AA. Section A is the inspection of trap-nested flocks on the

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farmer's own premises, which comes under the Poultry Division of the Live Stock Branch. Section AA is the trap-nesting of the birds in laying contests and tests and is conducted by the Experimental Farms Branch.

The egg laying contests conducted in 1919-20, with the number of birds and the locality, is given in the following table:—

EGG LAYING CONTESTS, 1919-20.

Name.	No. Birds.	Location.
Canadian Egg Laying Contest.....	500	Ottawa.
Prince Edward Island Egg Laying Contest..	220	Charlottetown.
Nova Scotia Federal Egg Laying Contest.....	200	Nappan.
Quebec Egg Laying Contest.....	200	Cap Rouge.
Manitoba Egg Laying Contest.....	200	Brandon.
Saskatchewan Egg Laying Contest.....	190	Indian Head.
Alberta Egg Laying Contest.....	120	Lethbridge.

THE BEE DIVISION.

Under the stimulus of the prevailing high price of honey, the year has seen a considerable increase in the number of colonies and out-apiaries kept by commercial beekeepers, who are thus definitely building up honey production in Canada. There has also been a large number of beginners in beekeeping.

Bees are now being kept at sixteen of the Experimental Farms. The latest addition is Kapuskasing in Northern Ontario, where valuable results are expected because of the extreme conditions in this northern locality, which nevertheless is not unpromising for honey production.

The season of 1919 was favourable for the production of clover honey at the Central Farm, Ottawa; 8,183 pounds were obtained, bringing the annual average production of honey per colony for the past seven years up to 134 pounds.

The testing and development of methods of managing bees planned to reduce labour and increase the production of honey per colony under the conditions found at Ottawa and other places in Canada, have been continued at the Central Farm and on some of the Branch Farms, and are giving promising results. The experiments are mainly in the direction of preventing swarming, improving wintering including a study of best foods for the winter—and increasing the force of bees raised in each colony in time for the main honey flow.

Experiments to ascertain the actual value of honey bees in the production of apples in Nova Scotia have been undertaken at the Experimental Farm at Kentville.

Co-operative experiments with private beekeepers in certain little-known and promising localities have been continued.

An experiment in the isolated mating of queen-bees was carried out at Duck Island, at the eastern end of lake Ontario. The results have been of considerable scientific interest and have indicated that this is likely to be a satisfactory place for studying isolated mating, which appears to be essential for the maintenance of any definite work in breeding bees for improvement.

TOBACCO DIVISION.

While the spring of 1919 was rather late and followed by drought, still the unprecedentedly high prices paid for tobacco made the crop highly profitable.

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In Ontario the production of White Burley was the largest since 1913, and was sold at an average price of 40 cents per pound. The flue-cured tobacco or Bright Virginia type was sold at an average price of 60 cents per pound.

In Quebec the season was more favourable for tobacco growing, and a fair crop was obtained. The demand for cigar tobacco, binders and fillers is strong, and an outlet has been found on the British market for this tobacco.

On the Experimental Station at Farnham, Que., the results obtained were very good. The yields and the quality of the crop were better than previously.

The fertilizer experiments conducted by the tobacco inspector and the superintendent of the station resulted in some exceptional and very profitable yields. No appreciable results were obtained from the application of lime.

The yields of the Cuban and the Yamaska varieties were 1,607 and 1,598 pounds per acre respectively.

The semi-hot bed proved vastly superior to the cold bed for the production of seedlings, both from the standpoint of earliness and the number of plants produced.

On the College Farm at l'Assomption, Que., the experiments conducted were not so successful, owing to the late date on which the work was started.

On the Experimental Station at Harrow, Ont., the results were highly satisfactory. The White burley and flue-cured tobaccos were the best produced since the Station was established. The White burley sold for 44 cents, and the flue-cured for 68 cents per pound.

The results secured at Harrow with the semi-hot bed confirm those obtained at Farnham.

During four years' experiments no advantage has been gained by sprouting the seed before sowing. Sowing dry seed is recommended.

The use of a black compost as a top dressing for seed beds is strongly recommended.

The value of home-grown seed is, at last, fully recognized by the tobacco grower and the seed merchant. Despite the fact that over 150 pounds of seed, sufficient to plant 24,000 acres, was grown on the Station in 1919, there will be an appreciable shortage of acclimatized seed.

Fall ploughing for burley again proved profitable. The increase in yield was estimated at \$24.64 per acre. Fall ploughing was also advantageous in giving a more even distribution of labour and materially lessening cut worm damage.

Fall manuring for burley gave an increased yield valued at \$100.32 per acre over spring manuring.

The best chemical fertilizer formula used for flue-cured tobacco netted a profit of \$238.35 per acre, and for the White burley of \$165.90 per acre.

On the Central Experimental Farm, at Ottawa, the experiments conducted on the plots were very satisfactory. A number of varieties and hybrids of cigar tobacco were tested on a small scale. A good quantity of seed of the varieties best adapted to commercial uses was also produced. There is a great demand for this seed among the growers of Quebec.

The work of the tobacco inspector is being appreciated by the growers. The information relative to the soils most suitable to the different types of tobacco is meeting with favour. The fertilizer tests conducted by the inspector in co-operation with the growers proved highly remunerative. The yields in some instances were exceptionally large, especially with the flue-cured type. The information obtained by the inspector as to the acreage and yields of the 1919 crop was timely and proved helpful in the marketing of the crop.

Owing to the warm and dry season which followed transplanting, the losses from the root-rot disease were not so severe as in previous seasons. Judging

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from field observations and counts, the mosaic and leaf spot diseases were not so prevalent.

Further selection work was carried on with the root-rot-resistant strains of the White burley and snuff types.

DIVISION OF ECONOMIC FIBRE PRODUCTION.

The work of this Division in 1919 was carried on along lines similar to those of 1918. However, much more progress was made in every department of the work, and a greater acreage was under crop, with a corresponding increase in the manufacturing of the resulting fibre.

SEEDING TESTS.

At the Central Experimental Farm, Ottawa, a total of fifty plots of one-tenth acre each was grown for test purposes. A great deal of attention was given to the rate of sowing, as many questions had arisen during the preceding year amongst growers regarding the proper amount of seed to sow per acre. It was unfortunate for the proper test of this matter that it was a very bad year for flax fibre, there being only about half a crop, except in a few isolated cases.

However, the results of these tests show that even in an unfavourable year, sowing at the rate of 84 pounds of seed per acre gives the best returns, both in yield and quality of fibre.

FLAX TESTS.

At the different Experimental Farms and Stations throughout the country, as well as by many private individuals, plots ranging from one-tenth to one half acre, were grown from seed supplied by the Experimental Farm, Ottawa. The crop resulting from this was to be returned to Ottawa, for tests regarding yield and quality of flax grown in the different localities. In many cases, however, principally on account of the bad year and poor yield, the result of these tests was not returned. From the crop that was returned it was found that New Richmond, Quebec; L'Assomption, Quebec, and Stanbridge East, Quebec, produced flax of a very fine quality. In Alberta, on irrigated land, a small quantity was grown successfully, being of a high grade both in seed and quality of straw.

The plots grown in British Columbia and Ontario did not arrive at the Experimental Farm, Ottawa, in time for retting in the fall of 1919, consequently testing these plots had to be postponed until the spring of 1920.

RETTING OPERATIONS.

Owing to the fact that there were 100 acres of Ontario Government flax grown at Willowdale, Toronto, in 1918, to be handled at the mill at Ottawa, practically all the retting had to be done on a commercial rather than on an experimental basis. All this flax was retted in 1919, partly dew retted and partly water retted. In water retting, the concrete tanks have a capacity of about one ton of straw each. It was found that by heating the tanks to 80 degrees F. a tank could be retted in $4\frac{1}{2}$ days, with good results as to the quality of fibre produced.

SEED INSPECTION.

In order to safeguard the export to Europe of the 1919 crop, a system of grading and inspecting fibre seed was established, by which means the buyers in Europe were assured of reliable seed, and the growers here had, as an advan-

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tage in the disposal of their seed, the fact that it had been passed by Government inspectors.

The chief officer of the division spent three months in Ireland during the end of 1919 and the beginning of 1920, and all possible assistance and advice was given to the Canadian flax growers in disposing of their seed. It may be said that the Irish growers expressed a decided preference for Canadian Ontario seed to that of any other variety.

FLAX GRADING.

A system of flax grading was started in 1918 and was found to be of the greatest possible advantage to the growers. This system of grading was enlarged in 1919, and it must be emphasized that, in order to obtain and retain a ready market, it will be necessary for all growers to have their flax graded in future. The grading system used in 1919 was the same as was adopted first in 1918.

NEW MECHANICAL APPLIANCES.

A Speedo scutching machine has been installed at the Experimental Farm, Ottawa, and is giving good results as to the amount of work it can turn out per day, but the fibre produced is not so good or uniform as the hand scutched fibre. Experiments with this machine are being continued and it is hoped that eventually it will be quite a boon to the flax industry.

The Vessot pulling machine is still also under experiment, and it has given every indication that it will eventually solve the difficulty of hand pulling.

There is also being tested out a new threshing and deseeding machine, which also promises to be highly successful.

PRAIRIE FLAX STRAW.

The experiment started in 1918 in connection with the prairie flax straw was completed in 1919.

It was found that prairie flax straw can be manufactured into binder twine and can be utilized in the manufacture of felt. The formation of a company to operate in Western Canada on this prairie straw is at present under consideration, and this should prove of great financial advantage to the western flax growers.

DIVISION OF CHEMISTRY.

The loss, through resignation during the past year, of several members of the technical staff of the division very materially reduced the working force; this fact and the continuance of special war work requiring immediate attention has seriously affected the satisfactory progress of those investigations the prosecution of which constitutes the primary function of the division's activities. This branch of the work, however, has by no means been neglected and though, in certain cases, work has been suspended for the present, the more important investigations have been to a limited degree carried forward.

It is very satisfactory and encouraging to note the continued and ever-increasing response on the part of the farmers throughout the Dominion to take advantage of the offer of advice, information and suggestion in matters in which chemistry can assist practical agriculture. This must have resulted in a greater and more economic production of food stuffs on the farm in numberless cases. Correspondence with the "man on the land" has been from the establishment of the Farm system an important phase of the division's educational work. During the past year this correspondence has been more than usually heavy, and, one may be assured, has accomplished practical results of no small value.

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The total number of samples received for analysis and reported on during the past year was 7,643.

Of these, 3,916 were flour, submitted by the Wheat Export Company, the official Canadian agents of the Allied Governments, and to whom had been entrusted the purchasing of all flour supplies, since the early days of the war, for military and civilian use overseas. Our control work in this matter during the past four years has effected for the Empire and the Allies a saving of many thousands of dollars and, by keeping down the moisture content, has ensured the flour from spoiling during ocean transportation and storage. It has also, no doubt, been of value towards maintaining overseas the reputation enjoyed by Canadian flour for quality and strength.

The samples of feeding stuffs include a series of some 400 samples of feeds: bran, shorts, oil cake meal, chops and provenders, etc., etc.,—collected throughout the Dominion. This investigation has had for its object the obtaining at first hand information as to the character, quality and purity of the various feeds as found on the Canadian market. In addition to a complete chemical analysis, a microscopical examination of each sample has been made by the Seed Branch to determine the relative purity of the feed with respect to the presence of noxious weed seeds and other foreign matter. The work on this investigation is about completed and the publication of the results will not only indicate the condition of the feeds as they are upon the market to-day, but prove a valuable report for reference and for the general use of farmers and raisers of live stock in the Dominion.

About 100 samples of feeding stuffs have also been submitted by farmers, and these have been similarly analysed and reported on as to nutritive value and purity. The reports thereon have been written in such a way as to give the sender direct and definite information regarding the quality and nutritive value of the feed and to assist him in making an economical choice among the various feeding stuffs available for purchase.

Assistance has been rendered to farmers by the examination of soil samples. These are not submitted to complete chemical analysis, but such work of a chemical nature and physical character is done on them as will enable a report to be made as to their general nature and fertility, with suggestions as to improvement by drainage, manures, and fertilizers, suitability for various crops, etc.

Closely related to this phase of work has been the examination and reporting on several areas in the northwestern provinces, British Columbia, and New Brunswick under consideration for the settlement of returned soldiers.

The chemical and physical examination of soils in connection with the classification of certain lands in southern Alberta and Saskatchewan has been continued. This investigation, which is undertaken for the Reclamation Service, Department of the Interior, has for its chief object the determination of the "alkali" in suspected areas, assisting in the classification of the lands involved into irrigable and non-irrigable. Soils from areas under consideration for reclamation by drainage, have also been examined and reported on as to suitability for cultivation. Progress has also been made in the study of a number of problems closely related to the occurrence of alkali, e.g., the alkali content of soils as related to crop growth and the influence of irrigation on the vertical movement of alkali.

The influence of seasonal conditions—precipitation and temperature—on the composition of wheat as grown on the Farms and Stations of the Experimental Farm system throughout the Dominion is being studied. This investigation, carried on with the co-operation of the Meteorological Service, has been in progress for a number of years and is yielding results of a valuable character in connection with the agriculture of the wheat-growing areas of Canada.

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Analysis of sugar-beets, from Canadian-grown seed, as grown on the branch Farms and Stations, have been made. The results have demonstrated the high quality of beets from Canadian-grown seed and the suitability of soil and seasonal conditions in many parts of the Dominion to produce roots rich in sugar and of high purity.

The relative feeding value of a large number of standard varieties of field roots—mangels, turnips, and carrots—as grown on the Central Farm, has been determined. As in former years, great differences in dry matter and sugar content were found between varieties in the same class of root. This work of late years has been carried on in conjunction with the Division of Forage Plants, the chemical data assisting in the selection and breeding of important varieties.

Investigational work with fertilizers has been continued on a number of the Farms and Stations of the system. While it would be impossible in this report to enter into any detailed discussion of the results obtained, one or two outstanding features may be mentioned, as follows: the value of basic slags for heavy clay loams well supplied with humus; the superiority on the larger number of soils and for most farm crops of a "complete" fertilizer over one furnishing a single fertilizing element; the greater economy on "worn" lands of moderate applications of fertilizer in conjunction with farm manures than from the use of either alone; the forcing value of nitrate of soda as a top dressing in the earlier weeks of growth (*a*) on meadows, and (*b*) for many market garden crops.

Rain and snow have a fertilizing value. Analysis of the precipitation at Ottawa shows there is furnished from this source between 5 and 6 pounds of nitrogen, per acre, annually, in readily available forms.

The analysis of waters from farm homesteads continues to be found a popular and valuable phase of the division's activities. While the results of this work continue to show that the supplies on many farms throughout the Dominion are seriously polluted, it is equally evident that a large number of our farmers are now alive to the importance of pure and wholesome water for man and beast. It is encouraging to note that many are taking steps to secure such a supply and to safeguard it against local contamination.

Ground limestone as an agent for correcting soil acidity and as an amendment for the physical and chemical improvement of soils, is yearly receiving an extended use in the eastern provinces of the Dominion. In this connection the division has analysed during the past year a number of samples of limestone and reported on the quality of the deposits involved, for the manufacture of ground limestone.

The Meat and Canned Foods Division (Health of Animals Branch) submitted for examination and report during the year, 1,809 samples. These included condensed milk, butter, oleomargarine, lard, tallow, denaturing oil, preserved meats, sausages, preservatives, colours and dye stuffs, spices and condiments, evaporated fruits and vegetables, etc. The results of this work are used in standardizing and controlling the purity of the products of the packing-houses and canneries of the Dominion. Chemical assistance has been rendered several Departments of the Government service and in this connection it may be stated that the cancelling ink now used by the Post Office Department throughout the Dominion is manufactured from a specification drawn up by the division, after much careful investigatory work.

DIVISION OF BOTANY.

DESTRUCTIVE INSECT AND PEST ACT WORK.

The efforts of the department to investigate the white pine blister situation in Canada were continued during the year. The establishment of four control areas begun in 1918 was completed, and a fifth area laid out. The object of the control areas is to determine the efficacy of removing all currant and gooseberry vegetation which are within 500 yards of the white pine control area. Northwestern Ontario was found to be free from the disease. No increase in the number of diseased trees was found in 1919 over the number found in 1918. It would appear that if there is any progress of the disease—which is doubtful—such progress is extremely slow.

By Order in Council passed April 4, 1919, subsection *f* of section 7 of the Destructive Insect and Pest Act relative to admitting currant and gooseberry plants from the state of New York into the province of Ontario, was amended to permit of such admission.

Section 12 of the same Act was amended April 4, prohibiting shipments of five-leaved pines, currant and gooseberry plants into Alberta and British Columbia from any other province of the Dominion.

By Order in Council passed on April 19, subsection *g* is added to section 7 of said Act, prohibiting the importation into Canada of certain species, hybrids and varieties of *Berberis* and *Odostemon* (Mahonia).

Section 12 of the same Act was amended April 19, prohibiting shipment of certain species, hybrids and varieties of barberries and *Odostemon* (Mahonia) specified under subsection "*g*", section 7, into Manitoba, Saskatchewan and Alberta from any other province of the Dominion.

The potato certification service is making satisfactory progress. It is continually made use of by farmers and seed growers and is now being extended into the provinces of Manitoba, Saskatchewan and Alberta, where it has met with the most valuable co-operation from the provincial authorities. In Ontario the work is beginning to show good results. Certified seed potatoes towards the end of the fiscal year brought prices as high as \$5-\$6 per bushel. With wider production of disease-free seed potatoes, these prices will tend to lessen and the object of the work will be attained, namely not merely to encourage the growing of high-class seed potatoes, but to effect a general improvement of yields owing to the elimination of yield-reducing diseases of the seed tuber.

The free nitro-culture distribution was continued, and is being made use of more widely. The results obtained from the use of these cultures have been very promising in many cases throughout the Dominion.

The work in the field laboratories has made satisfactory progress. At the St. Catharines Field Laboratory, attention is paid to the control of the very destructive brown rot of stone fruits, peach canker, a troublesome disease, leaf curl of raspberries, and many other problems affecting the local industry. At the Charlottetown Laboratory, the principal investigations related to early and late blight, leaf roll, mosaic, curly dwarf, and similar diseases of potatoes. Spraying of potatoes is more systematically practised in Prince Edward Island than before, largely due to the demonstrations of the beneficial results from spraying, carried on by the officers of the division.

At Fredericton, attention is largely devoted to investigations of mosaic and anthracnose disease of beans, the diseases of peas and other vegetables, as well as to the control of club root of turnips, glume spot of wheat, and other local problems.

Co-operative work is conducted at various private farms as well as at Cap Rouge and St. Anne de la Pocatière, Que.

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The rust research work is carried on under direction from Ottawa, under the immediate supervision of the officer in charge, at Saskatoon, Indian Head, and Brandon.

Some interesting results have been obtained. The black stem rust was found to winter over on wild barley, and summer spores collected in April, having passed over from last season on this weed, produced, when transferred to wheat, the typical red rust stage. Late grain was badly rusted during the year—which is the usual experience. Several localities in the west were entirely free from rust.

Investigations into the nature and control of a number of grain diseases were carried on, and the experimental plots established in various localities throughout the west are getting into shape for "strains of rust-fungus" observations. The barberry eradication measure promulgated by the department has met with every support from the provincial authorities concerned.

From January to the end of March, the officer in charge of the laboratory at Saskatoon gave a course in plant pathology to the university students.

Other investigations of a technical character are being carried on at all the laboratories; these are partly of an informatory and partly of a research character.

In economic botany a large amount of work was done in giving information on weed control, medicinal and poisonous plants, etc., and in the identification of specimens sent in. An investigation was made into plants useful for binding drifting sands. Progress was made in the compilation of a catalogue of the native plants of Canada.

THE CEREAL DIVISION.

THE SEASON.

On the whole the season of 1919 was much more favourable for cereals in Eastern Canada than in the central and western parts of the country. There was a period of rather acute drought in Ontario and in parts of Quebec during June and July, but this was much less severe than the drought from which large areas in Saskatchewan and Alberta suffered.

From a cereal point of view the year was one of the poorest on record, so far as yields are concerned; but the abnormally high prices enabled many of the farmers to make good profits from yields which in pre-war times would have been produced at a loss.

TESTS OF VARIETIES.

The methods of carrying on plot tests are being gradually improved from year to year as experience accumulates and the imperfections of the older systems are revealed. It is impossible, however, to carry on very instructive tests under the severest conditions caused by heat, drought and high winds, such as prevailed at a few of the Farms this year. The results at most of them, however, were interesting and valuable, but the details cannot be given in this brief summary. Many hundreds of varieties are being tried and from these the best only are being retained for propagation and introduction. At Ottawa where the largest number of new varieties is constantly under test, about 1,100 sorts were grown in 1919.

NEW VARIETIES.

The new hullless oat, Liberty, Ottawa 480, has produced a distinct sensation. It excited so much interest that the stock for distribution proved altogether inadequate. About 550 samples were sent out, although, had the material

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been available, 10,000 samples could have been placed. The unusual character of this variety no doubt induced many farmers to apply for it. While this oat may not prove well adapted to every district in Canada, it certainly gives promise of being valuable over very large areas.

The extremely early maturing bean which is being sent out under the name of Norwegian, Ottawa 110, was in considerable demand also, but the distribution of it was restricted to districts where the ordinary beans do not succeed. While the Norwegian is satisfactory for cooking purposes, its brown colour is a disadvantage and we do not wish to encourage the growing of this bean where the more popular white varieties will mature.

A new fibre flax, Longstem, Ottawa 52, was available in small quantities but only a very few samples could be distributed. Arrangements have been made, however, to send out a much larger number next year, as it is believed that this flax has quite a future before it on account of its extreme length. It has already been tested for fibre production and found to be of unusual value.

No distribution of the new pea, Mackay, Ottawa 25, was possible this season, but if the harvest of the coming summer is at all good there will be a small stock available to send out next winter. This is one of the most productive peas known.

MARQUIS WHEAT.

This famous wheat, now recognized as the standard variety in Canada, has added another triumph to its already long list of victories by winning the highest award at the International Soil Products Exposition at Kansas City, Missouri. The prize winning exhibit was grown near Regina, Sask. In spite of the efforts which have been made, by extensive advertising, to displace Marquis by more recently introduced varieties, the pre-eminence of the older sort is still maintained, there being undoubtedly a considerably greater acreage of Marquis sown (in Saskatchewan and in some districts in Manitoba and Alberta) than of all other varieties of wheat together.

FREE DISTRIBUTION.

Although a very large number of applications for free samples was received, the number distributed was not so very great, because we were obliged to disappoint thousands of applicants for samples of Liberty oats: applicants who did not seem anxious to receive anything else but the one sort. About 9,000 free samples were sent out; these consisted of spring wheat, oats, barley, peas, beans and flax. This was the first season in which beans and flax were on the list of grains for distribution.

MILLING AND BAKING TESTS.

It was not possible to give much attention to milling and baking tests during the past year as the time of the assistant who has carried on that work in the past was unavoidably given largely to other work. The principal tests which were made were to determine the baking qualities of a number of new cross-bred varieties of wheat, crosses between Marquis and Prelude, and between Prelude and another early sort which is not yet named. Other tests and investigations, such as those in regard to the effect of storage, have been suspended, but will be taken up again as soon as an assistant trained for such work has been obtained.

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PUBLICATIONS ISSUED.

During the year two important little bulletins were issued, the first being entitled, "The Best Varieties of Grain," in which details were given as to the varieties recommended for the different soils and climate of Canada. The other was called "The Use of Coarse Grains for Human Food." The aim of this bulletin is to encourage the use of oats, barley, peas, etc., as human food, on account of their advantages in price and in healthfulness; and also to show farmers in outlying districts how they can reduce the cost of their food by growing suitable varieties of grain and grinding them at home for their own use.

DIVISION OF FORAGE PLANTS.

FIELD-ROOT SEED GROWING AS AN EMERGENCY.

In conformity with the department's policy to ensure, through the Dominion Experimental Farms, an adequate supply of good field-root seed, the commercial stocks of which were seriously depleted during the war on account of import difficulties, the Division of Forage Plants arranged, in 1918, to have available large quantities of field-roots of the most popular varieties so as to be able, in case of need, to produce, in 1919, what quantities of seed might be needed to supplement the commercial supply.

The precaution was found to be justified and, accordingly, root seed growing as an emergency measure was undertaken in 1919. The following approximate quantities were produced:—

Mangel seed.....	15,000 lb.
Swede turnip seed.....	12,000 lb.
Carrot seed.....	1,000 lb.

This seed was handed over to the Seed Branch and, through its Markets Intelligence Division, supplied largely to farmers' organizations.

FIELD ROOT SEED GROWING AS A PERMANENT INDUSTRY.

As a result of what has been experienced during the last few years in the matter of maintaining an adequate supply of field root seed of satisfactory quality, the attention of the Division has been turned on considering seriously the possibilities for developing a Canadian root seed growing industry which, if successful, might make the Dominion independent of imports.

Experience has already shown that a fine quality of seed of the various root crops can be grown in Canada but whether it can be done in successful competition with European countries is still an open question. The Division has realized that, in order to compete with Europe, it is, in the first place, imperative that the Canadian-grown seed represent first-class varieties, i.e. improved varieties, true to type and name. In order to obtain such varieties, the Division has instituted a system whereby it will be possible to improve gradually nearly all the main varieties of mangels, swede turnips, and carrots now on the Canadian market.

Quality of Field-Root Varieties. —The system referred to, although primarily worked out for the purpose of bringing about improvement in the main varieties sold in Canada, will also, it is hoped, have an educational value inasmuch as it will allow the distribution of samples of varieties of guaranteed quality. At the Central Experimental Farm at Ottawa, as well as at some of the Branch Farms, improvement of a few varieties has already been accomplished, and satisfaction with the work done has been expressed by many who have tried the varieties in question.

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The value of good seed of improved varieties can, it should be admitted, not be demonstrated to better advantage than just at present. During 1919, the division endeavoured to test practically all the root varieties offered for sale in Canada, the results showing that a very large number of varieties of an amazingly poor quality are sold at present. There are, indeed, indications to the effect that the quality of imported seed, in respect to varietal type and truthness to name, may continue to remain low for a time, largely on account of the fact that certain European countries have for export immense quantities of seed of a rather questionable "genuineness." With the imported varieties low in quality, the Experimental Farms will therefore have a particularly good opportunity to demonstrate, through distribution of seed of guaranteed purity, of what great importance the use of really good, genuine seed is. When such demonstrations succeed in creating a general demand for varieties of a better type than are now available commercially, then, it is safe to predict, the Canadian farmers will find it possible to secure far better returns from root crops than they do at present.

GRASS AND CLOVER BREEDING.

The breeding work with grasses and clover which during the war had to be largely curtailed was resumed this year. About two dozen new varieties of timothy were planted for comparative tests as to uniformity of type and value in general. For the same purpose five varieties of Orchard grass, six of Kentucky Blue grass, and thirteen of Western Rye grass were also planted.

Special attention has been paid to the Western Rye the last few years, following the discovery that, in mode of fertilization, this grass behaves much like wheat, *i.e.*, it is normally self-fertilized and therefore breeds true to type. A total of about one hundred distinct types, collected in Western Canada, have been brought to the Central Experimental Farm at Ottawa, where they will be thoroughly studied and tested for comparative agricultural value during the next few years.

THE DIVISION OF ILLUSTRATION STATIONS.

STATIONS IN THE WEST.

In 1919, seventeen Illustration Stations were operated in Alberta and fifteen in Saskatchewan, the rotations and cultural methods being similar to those carried on in 1918. In 1919, however, the weather conditions in the southern and central parts of both provinces were very unfavourable for all kinds of farm crops, but it was very evident that where a rotation included summer-fallow, much better crops were obtained.

Forage Crops.—The natural prairie is rapidly being broken, making it essential to find a substitute for prairie hay. Western Rye grass has been grown for several years on the Illustration Stations and, wherever possible, seed is grown, as there is a great demand for this seed, at prices such as to make it a profitable crop, in addition to which the refuse may be used for fodder.

Corn.—Corn growing in some cases was successful, while in others the extreme drought and early frost did considerable damage. However, it is advisable to grow a limited amount of corn each year to ascertain whether or not a profitable crop may be grown which would eliminate part of the summer-fallow. The Northwestern Dent variety, so far has proved to be the best.

Pure Seed.—Owing to the increased demand for good seed, the Illustration Station Division is making a special effort to produce large quantities of pure seed. The operators of the Illustration Stations usually, after the first year, have sufficient surplus seed grown on the Illustration fields to sow many acres on their own farms. The second year they usually have a large quantity for sale to their neighbours, at reasonable prices.

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STATIONS IN QUEBEC.

In 1919, sixteen Illustration Stations were in operation in Quebec, on many of which much progress is being made. In the Gaspé district, where potatoes are grown to a large extent, after-harvest cultivation is practised in preparing the land for the potato crop. Two-year meadows or pastures are broken about July 10, or earlier, the land being ploughed shallow, rolled and cultivated at short intervals to keep down all weed growth until autumn, when it is thoroughly ploughed and set up to the winter frost. Summer cultivation makes the sod suitable for the potato crop and destroys weed growth.

Corn.—When suitable varieties of corn are selected, it can be profitably grown in most parts of the province.

Roots.—Roots are grown on all the Illustration Stations. The farmers find them a necessary crop, as they supply succulent food to mix with the dry fodder for winter feeding, and they are also relished by all kinds of live stock.

Seed Grain.—One-quarter of the rotation is sown with one of the leading varieties of grain, which usually gives a surplus of seed to be sold for seeding purposes to the farmers of the surrounding district.

Clover.—One of the outstanding features of the illustration work is the improvement in the clover and timothy crops. Mr. Samuel Reddick, of Aubrey, Que., reports an increase in four years, of \$15 per acre on his clover hay and \$50 per acre on his clover seed. Clover seed growing was almost unknown in the Aubrey district before the Illustration Station was established, while a low estimate of the 1919 crop is \$30,000. Several other districts, where Illustration Stations are in operation, are making good progress in growing clover for seed, and may even surpass the Aubrey district.

Tile Drainage.—There are many parts of the province which could produce one-quarter more, if the land were tile-drained. An illustration on one of the Stations has shown an increase of 26 bushels of oats per acre in two years. In 1919 the increase in yield was not so noticeable on account of the season being particularly favourable to wet land and to the manner in which the land is now being ploughed and ridged.

New Stations.—During 1919, the illustration work has been extended somewhat in Quebec, seven Stations having been established which will be in operation in 1920.

Illustration work has also been extended to New Brunswick and Nova Scotia. Six Stations have been selected in Nova Scotia and four in New Brunswick. These will be in operation during the coming season.

THE DIVISION OF EXTENSION AND PUBLICITY.

The work of the Division of Extension and Publicity during the year consisted, as in previous years, in the preparing and staging of exhibits at fall fairs, poultry shows, seed fairs, and corn shows, and in the distribution of literature at these different exhibitions.

The chief of the division, who left for France early in 1919, in charge of an exhibit to the Industrial Fair at Lyons, did not return to Canada until August. During this time an exhibit was prepared and sent to Western Canada, and shown at the following fairs: Regina, Calgary, Edmonton, Saskatoon, and

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Brandon. Exhibits were also sent from the Central Farm to a number of fall fairs in Ontario, and larger exhibits were staged at Ottawa and London. During the fall and winter a special poultry exhibit was sent out to a number of leading poultry shows, including Toronto, St. Catharines, Peterborough, etc.; exhibits were also sent to corn shows and seed fairs in western Ontario.

Exhibits were also sent out from the Branch Farms to the local fairs, although in some of the provinces it was found necessary to curtail the work owing to the scarcity of assistants. In Manitoba and in parts of British Columbia, the exhibition work consisted chiefly in the exhibiting of live stock.

As the same exhibit structure had been at some of the Branch Farms for a number of years, it was thought advisable to have these changed, and during the month of January the structures from Saskatchewan, Alberta, and British Columbia were assembled at Lethbridge, where the British Columbia exhibits were repaired, revarnished, and the legends changed to suit the Prairie Provinces, and the prairie structures changed to suit British Columbia, and were then reshipped to the different Farms.

Applications to the Central Farm for publications were also attended to, and much literature, chiefly exhibition circulars, was distributed at exhibitions.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

Seeding was not general in Prince Edward Island until May 18. The season, though late, was favourable for all farm operations. Frequent showers throughout the growing season gave full crops of hay, grain and roots. The early part of haymaking, which commenced July 17, was fine; this was followed by showers which retarded the work and made it difficult to save the balance of the crop in good condition. Grain was cut August 25; a good harvest followed and all cereals threshed out better than was expected. A frost on September 15 killed potato tops in many sections of the province; quite a little rot was reported, but the crop in general was a good one. Satisfactory yields of turnip and mangel seed were obtained.

The favourable weather during the autumn enabled the farmers to get their work well completed before winter, which set in with great severity the third week in December.

The first Prince Edward Island egg-laying contest of twenty pens, was a great success. A second one was started with two additional pens on November 1, 1919. The birds were not as mature as they ought to have been and the winter laying has not been up to expectations, but these contests have already created a great amount of interest in the improvement of the poultry industry in this province.

An office building and seven contest poultry houses were constructed during the year.

Several valuable additions were made to the Ayrshire herd at the Station, which now totals six cows and is headed by the valuable bull Ottawa Ivanhoe.

EXPERIMENTAL STATION, FREDERICTON, N.B.

The open autumn of 1918 permitted of fall work on the land being brought well toward completion. There was very little winter-killing. Spring opened early, the first ploughing being done April 23.

June and July were dry and cool, August and September moist and cloudy with heavy rains in the latter month which made harvesting difficult. The first heavy frosts occurred October 2 and 9. The winter of 1919-20 has been one of the roughest recorded in the province.

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Fourteen draught, and two general-purpose horses, together with 3 three-year-old colts, 3 two-year-olds, one yearling and two colts under one year, are on the Station. Of these seven are pure-bred Clydes, nine high-grade Clydes and five high-grade Percherons.

In dairy cattle, the dairy Shorthorn, Ayrshire and Holstein are kept. The first-named breed gave the highest producer for the season, 14,682 pounds milk for a lactation period of 395 days. Grading-up experiments are under way with all the above breeds.

In swine, the Yorkshire breed is kept and a number of pigs were sold for breeding. The flocks of Shropshire and Cheviot rams were sold to farmers.

With poultry some very instructive data as to cost of production were gathered.

With bees the average return per colony was valued at \$22.18.

In field crops, hay yielded a little over two tons per acre; oats, 65½ bushels; turnips, 733 bushels; and ensilage corn, 17.2 tons per acre. Potatoes yielded 297 bushels per acre.

Test work with cereals, forage plants, fruits and vegetables was conducted.

A comparison of Canadian-grown turnip seed with imported seed showed the former as yielding over 300 bushels per acre more. A considerable quantity of turnip seed was obtained from stecklings grown on the Station the year before.

A bull barn was built during the year, also two brooder houses and some general repair work done. Two acres were stumped, burned over and ploughed and a large quantity of stone removed.

Exhibits were made at several fairs and a number of meetings addressed by the superintendent and his assistant.

The Fruit Growers' Association and the Farmers' and Dairymen's Association, of New Brunswick, held excursions to the Station.

EXPERIMENTAL STATION, KENTVILLE, N.S.

The spring weather in 1919 was about perfect for putting in the crop. The soil dried out early, worked up in good tilth, and the weather remained fine during seeding operations. The season was good for crop growth, the rainfall being about normal, amounting to 16 inches from April to September inclusive, very well distributed throughout the growing period. There were no frosts after the 17th May and the first fall frost to kill tender crops at this Station was on the 2nd October. There were no heavy windstorms to cause damage to crops. The hay and cereal crops were well above the average. The harvesting weather was not entirely satisfactory because of very frequent rains which delayed grain harvesting very much.

The corn crop was the best ever harvested, the average of one 8-acre field being 18 tons 1,620 pounds per acre. The Longfellow variety has proven the most satisfactory. The total corn ensilage harvested amounted to 255 tons. Eight acres in clover yielded 25 tons 550 pounds, and the second crop on this area produced 960 pounds of clover seed. The total hay secured amounted to 135 tons and this, with the corn, furnished the roughage required for the Station stock. Twelve acres of Banner oats yielded 753 bushels or at the rate of nearly 63 bushels per acre. The total grain harvested was 1,352 bushels. Four and one-half tons of turnip seed were also grown.

An average of 50 head of dual-purpose Shorthorns were carried during the year. These have made some very good records. Hedgyn Susan has averaged, for four lactation periods, 7,711.6 pounds of milk for a lactation period averaging 301 days and an average dry period of 50 days. The milk tested slightly over 4 per cent of fat. The average profit per lactation period above cost of feed

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was \$78.96. Twenty steers were also carried in a feeding test during the winter. These made little profit above cost of feed.

In poultry, the White Wyandotte and Barred Plymouth Rock only are kept. These have made good profits during the winter. One pen of Wyandotte pullets averaged 62.27 eggs, and a pen of Barred Rocks averaged 60.46 eggs each for the months of January, February and March.

The apiary work has been extended from 21 to 36 colonies of bees. The average yield of honey was 122.8 pounds per colony. The highest yield from one colony was 316 pounds. The average production per colony was worth \$29.30.

Experiments to determine the value of limestone were continued during the year. For a period of six years the value of the crop from an acre area on which ground limestone at the rate of 2 tons per acre was used in the first and third years, was \$479.17, and on that not limed but otherwise fertilized and cropped in a similar way was \$410.17, a gain of \$69 per acre from the use of 4 tons of limestone, costing for material and application, \$16.80. Various fertilizer tests on field and orchard crops were also made.

The fruit crop on the whole was good. A heavy frost on the 20th October injured fruit not harvested at that date, resulting in some cases in much loss to the growers. The prices received for fruit exported were low and this, together with the high prices paid for barrels and high wages paid labour for harvesting, resulted in little profit from the orchard areas.

In order to aid in the carrying on of training work for returned men who wished to engage in agriculture, an adjacent farm of 130 acres was purchased, and on this, men in training were given a practical training course under the direction of the Soldier Settlement Board. The men were housed in buildings on the Station property, the tools, implements and teams from which were placed at their disposal for this work.

EXPERIMENTAL FARM, NAPPAN, N.S.

The freeze-up for winter came on November 17, 1918, but winter itself was mild throughout with very little snow on the ground at any one time. The weather through April, 1919, was very backward, a normal mean average temperature prevailed throughout May with an occasional shower. Owing to the fact that very little fall ploughing was accomplished in the fall of 1918, seeding operations were late. June and July were good growing months, but August weather was most unfavourable for hay-making, rainfall being recorded on thirteen different days during the month. September was normal in respect to temperature but lacked sunshine. October was a normal month but November was characterized by heavy gales and a precipitation of 5.69 inches. The total precipitation for the year from January 1, 1919, to December 31, 1919, was 33.42 inches. Notwithstanding the unfavourable weather conditions, most crops were harvested in fairly good condition at the Farm.

There was a good increase in live stock kept at the Farm during the year, especially in cows and sheep. Twenty-three head of beef steers were fattened during the winter.

The poultry work was extended and in November, 1919, an egg-laying contest was started, with twenty entries of ten birds each, and to date very encouraging results have been obtained, approximately nine thousand eggs having been laid by the two hundred birds.

The season was not very favourable for honey production, only five hundred and ninety-nine pounds of extracted honey being produced from seven colonies, spring count.

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All grain, except mixed grain, was below the average. Oats yielded from 39 to 46 bushels per acre, wheat, 15 to $16\frac{1}{2}$ per acre; barley from 16 to 23 bushels per acre; buckwheat from $13\frac{1}{2}$ to $16\frac{3}{4}$ bushels per acre; corn gave an average yield of 12 tons, 1,192 pounds per acre; mixed grain, 44 bushels per acre. Hay both on the upland and marsh showed an increase over the previous season. The range in yield on upland was from 1 ton, 1,400 pounds to 2 tons, 108 pounds, while the marsh land ran from 1 ton, 675 pounds to 1 ton, 836 pounds. The total hay cut was 325 tons, 440 pounds. Owing to unfavourable conditions the quality was only fair.

Roots were very poor, the season being most unfavourable, consequently the yield was below the average, being only $508\frac{1}{4}$ bushels to the acre.

Liming experiments go to show that ground lime stone will increase the production on our average soils.

The apple crop was above the average for most varieties. Strawberries were just an average crop, there being much winter killing. Bush fruits were fair, gooseberries and raspberries falling below the average.

The season was a poor one for potato production; the range in yields ran from 136 bushels, 40 pounds, to 433 bushels, 20 pounds, per acre. Dry rot was much in evidence.

Some four acres of Monarch turnip stecklings were grown and pitted and 1,500 pounds of seed was produced.

The necessary general repairs to all buildings were carried out and the roof of the bull and calf barn was shingled. A new farm cottage, 26 by 33 was built. An addition 30 by 33 was built on the old house at the creamery and the whole divided and made into a double house. Ten new colony houses were built for the contest work. Some 2,000 feet of woven wire fence was erected during the season.

The split-log drag was used, not only on the Farm roads but on the roads leading from the Farm to Maccan and Nappan stations.

Agricultural meetings and exhibitions were attended by the superintendent and assistant to the superintendent and many excursions visited the farm during the year.

EXPERIMENTAL STATION, STE-ANNE DE LA POCATIÈRE, QUE.

The spring of 1919 was late and wet, which kept back seeding operations until the middle of May. Precipitation was sufficient during the growing season and the weather was warmer than in preceding years. This resulted in a very rapid growth and complete maturity of all the cereal crops, and also made possible an abundant harvest of roots. The crops of small fruits were light, but on the contrary the apple crop was a very good one. Both native and European trees and also pear trees were severely injured by the winter of 1919, about one-half being totally destroyed by winter killing and the other half very seriously affected. The crops, therefore, of these fruits were practically nothing in 1919.

The work with rotations, cultural methods, cost of production, test of suitability of varieties, etc., etc., was continued as in previous years. Tests of varieties of cereals, forage plants, vegetable crops and fruits were also carried on, as well as a number of experiments on the value of insecticides on the various crops.

Nineteen horses were on hand, including eight Percheron mares and one Percheron stallion, these doing the work of the Farm, and considerable breeding with them is also being carried on. Interesting figures are being collected on the cost of raising colts, comparison of feeds, methods of housing, etc. The dairy herd of pure-bred and grade Ayrshires is gradually increasing year by

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year and improving in quality. Figures are being gathered as to the cost of raising animals to a productive age, also experiments in feeding, care and management are conducted. Yorkshire swine are kept, the work so far being confined to feeding experiments. A flock of Shropshire sheep is now being formed. With the bees, experiments are being carried on in different methods of wintering. The work with poultry is just commencing. The flock is being brought up in numbers so that various tests and comparisons may be carried on.

A considerable amount of work in farm improvement was done during the year, such as work on the roads, gathering stone from the fields, drainage, etc., as well as repairs to certain of the buildings.

An exhibit was made in seven fields in the district during the year. Three excursions were held to the Station and a number of farmers' gatherings were addressed by the superintendent.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

The season.—The growing season, May to October, inclusive, in central Quebec, was warmer, dryer and duller than the average for the past seven years, the figures being, respectively, 57.48 and 56.27 degrees F. for the mean temperature, 25.43 and 25.87 inches for the precipitation, 1,123.5 and 1,404.3 hours for the sunshine. Corn and hay were better than usual, while swedes were very poor. Potatoes were good and so was grain, except peas, which were only medium. The fruit crop was fair, with the exception of cherries which did not yield anything. Vegetables were extra, except roots, which were a poor crop.

Live Stock.—A new Horse Farm was started, on a leased property of 450 acres, with thirty French-Canadian brood mares. Three more French-Canadian heifers went through the Record of Performance, which gives Cap Rouge the distinction of having more qualified females than any other herd in existence. The flock of Leicesters, numbering about one hundred head at the end of the fiscal year, is the largest in the province. The egg-laying contest for Quebec is located at this Station and the two hundred birds are doing well. Experimental work with different kinds of stores for wintering bees was continued.

Crops.—Very interesting data were gathered, as to cost of production, comparison of rotations, rates of seeding, spring versus autumn ploughing for corn, etc. Variety tests of forage plants and cereals were made, seed produced for distribution and sale, and the isolation of good strains continued.

Fertilizers.—A project was started to test the influence of phosphoric acid in promoting the maturity of corn. Burnt lime as compared with ground lime stone on large areas, which seem to promise better results than on small plots.

Horticulture.—The orchards at Cap Rouge are now the most extensive in the province of Quebec, as the only two larger ones lost a great many trees in 1917-1918 while very few died here. There were 71 different projects with vegetables, which consisted of cultural experiments, breeding, and variety tests. Some of the seed produced at Cap Rouge, of tomatoes, for instance, has been distributed, on request, to every province of the Dominion and even to the Yukon Territory. In 1919, 680 different varieties of flowering plants and ornamental shrubs were tested.

Miscellaneous.—A good horticultural barn, with an underground but well ventilated modern cellar divided into six different compartments, was completed. An exhibit of Station products was made at five different points and three diplomas were received. The correspondence and the number of visitors increased about 25 per cent, compared with the previous year, which shows that farmers take more and more interest in the work of the Station.

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EXPERIMENTAL STATION, LENNOXVILLE, QUE.

Ploughing was commenced on April 19 and seeding on May 8. The very mild winter of 1918-19 was very beneficial to the clover crop; the first cutting, which was saved for hay, was commenced June 20. The second cutting started August 15, and was put into the silo, in which it conserved very nicely and made the best of feed for all live stock. The season was also very favourable for grain and the corn crop.

The Ayrshire dairy herd has had a very good natural increase this year. The herd at present comprises 38 head, and 7 females qualified in the official Record of Performance. The work with this herd consists in ascertaining the actual cost of milk production, the cost of rearing calves and yearlings on different feeds.

A new sheep barn was erected at this Station, 24 by 74 feet, which accommodates a flock of 60 registered and grade Oxford Downs.

One hundred and eight thousand feet of under-drainage was done this year; 350 rods of permanent fencing was erected, and the farm road of 3,457 feet was completed on the east boundary of the Farm.

The poultry plant now in operation consists of an administration building, two permanent houses, 16 by 32, for the accommodation of 200 hens, and 5 colony houses. The work is with the Barred Plymouth Rock breed, all of which are trap-nested with the object of improving production as much as possible and to demonstrate the increased revenue which may be derived from birds of the best laying strains.

EXPERIMENTAL STATION, LA FERME, Que.

The spring of 1919 was warmer and drier than that of the preceding year. Snow had completely disappeared by May 1. May and June were warm, with little rainfall—conditions favourable to sowing but too dry for good growth. On June 22 and 28 heavy frosts did a great deal of damage. July and August were hot, with a good rainfall, which saved the crops. September was cold and wet, and harvesting was difficult; there was a heavy frost on the 10th. October also was cold and wet.

The hay and grain crops were below average but forage crops and vegetables yielded well.

The dairy herd is made up of some grades headed by an Ayrshire bull. A flock of common sheep with a Cheviot ram, has been established and has aided greatly in clearing away undergrowth. The herd of swine is made up of 30 Yorkshires, from which demands for breeders have been met.

During the season 25 acres were cleared and 10 acres stumped and broken; 2 miles of fencing was put up round the Farm boundaries; work was done on the Farm roads and on the highway, also on the extension of the water system, gathering stone, surface drainage, etc.

A boarding-house and two cottages have been erected for the employees, and a stable has also been built.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

The months of April and May, 1919, were the most favourable for farm work that have been seen at this Station since it was opened. Seeding operations commenced May 17 and warm weather with local showers following directly after seeding caused a rapid germination of all seed. Rapid growth continued until the middle of July, when all crops were seriously checked by drought which continued until the latter part of August. From September until winter set in it might be said that there was a continual rainstorm.

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Fall wheat yielded 30 bushels per acre; Ruby wheat matured and yielded 26 bushels per acre; Marquis wheat, Prelude and Huron matured, yet, owing to extreme wet weather, the three last-named varieties could not be successfully harvested.

The hay crop was light, yet of excellent quality and was harvested in good condition. A second crop of clover was taken from some of the land, and was cut and used for ensilage.

Peas, oats and vetch grown for ensilage purposes were successfully harvested, yet the extremely wet weather during the fall months made the harvesting of this crop most difficult.

Potatoes, turnips and mangels gave an exceptionally fine yield. Some trouble was encountered with cutworms that attacked the mangels.

A very successful year may be reported in connection with all branches of horticultural work.

A start was made with bees, two colonies being supplied by the Central Experimental Farm, Ottawa.

Sixteen horses were kept at the station during the year. The dairy herd of grade Holstein and Ayrshire cows did well, the milk record being satisfactory. Satisfactory results are being obtained in the grading up of the herd.

The Shorthorn herd of beef cattle have, during the past year, given good results, an exceptionally fine lot of calves having been reared.

Results from the sheep flock were not satisfactory, from 19 lambs born from 12 ewes, 7 only were successfully reared.

A very successful year can be reported in swine husbandry, 52 young pigs being reared from 5 registered Yorkshire sows.

The farm boardinghouse was completed and affords excellent accommodation for farm help.

An implement shed was built, containing a carpenter and blacksmith shop.

A combined dairy and ice-house was built.

All farm buildings were painted during the past summer, adding greatly to the appearance of the Station.

One mile of roads was graded; 80 acres of new land were summer fallowed; 50 acres sown in fall wheat.

Seventy acres were cleared of timber during the winter of 1919-20.

Five hundred cords of pulpwood were taken from the land, this being cut in connection with land-clearing operations. In addition to the pulpwood there were 70,775 feet of spruce, poplar and balsam of Gilead obtained from the Station's property.

A 230-gallon-capacity coal-oil tank was installed.

EXPERIMENTAL STATION, MORDEN, MANITOBA.

The winter of 1918-19 was exceedingly mild, and the snow not deep at any time. The spring opened late, however. Early working of the land was out of the question, for the soil remained cold and sodden. The summer was one of the hottest on record. Many hot weather plants, such as melons and corn, ripened in the open. The winter of 1919-20 began on the 9th of October, and continued very cold with deep snow until the end of the fiscal year, March 31.

Horticulture is the main line of work at this Station. Probably there is at Morden the largest collection of hardy fruit trees to be found anywhere in Canada. The entire horticultural area of 90 acres was occupied with either fruit trees or garden in the summer of 1919. Much attention has been given the fruit industry in the hope of building up strains of fruit trees sufficiently hardy to withstand the rigorous prairie winter. The attempt has been made

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along three lines of endeavour, namely: *First*: The sitting out of all standard material which have in them hardy blood. *Second*: The crossing of certain standards with hardy crab-apple stock from Siberia and other northern regions. *Third*: Seedlings arising from the most hardy varieties known. From among this mass of material it is hoped to find varieties suitable to prairie conditions.

Experimental work has been carried on with the feeding of steers along similar lines to that carried on by other Farms and Stations, namely: Outside versus inside feeding; most profitable method of feeding; proper time to put on the market, and similar problems. The grading up work with sheep has been continued. Much improvement in the progeny has been noticed over that of the original range ewes, by crossing with pure-bred Hampshires. Fleeces are obtained from these grades weighing about ten pounds on the average.

Most excellent crops of timothy and clover were obtained as well as of Western rye grass. Some ten or twelve acres of rye grass were threshed for seed. It was found that the seed alone was worth more on the wholesale market than the hay would have been worth, if sold as such.

Some twenty acres of potatoes were grown at the Station, of the Irish Cobbler and Early Ohio varieties. These varieties yield well at Morden, and attract much attention. Large quantities of beans and peas were planted and show the possibilities of these crops in southern Manitoba.

Some progress has been made in the building operations. All of the machinery is now housed, and the sheep comfortably located in new quarters. The superintendent's house is nearing completion, and, though small, is well built and well situated.

Some twenty acres of land were purchased during the year, together with the buildings thereon. This will permit the opening up of the Farm from the village, and the beautifying of the grounds. The building of roads and preparation of this land will receive considerable attention during the coming season.

EXPERIMENTAL FARM, BRANDON, MAN.

Spring conditions were about normal at Brandon in 1919. The seeding began on April 22 and was completed in good time. Crop prospects up to the middle of July were unusually good, but rust and extreme heat, with winds, reduced the yield considerably below what the growth of straw indicated. However, even with this reduction, there was a fairly good crop of grain. Hay crops were light but corn was an exceptionally fine crop, producing a good grade of fodder and quite a considerable amount of ripe seed.

Records of feed consumed by all classes of live stock have been kept and figures on the cost of production and maintenance of all types of live stock kept on the farm are available.

Breeding operations with Clydesdale horses have been continued. Three colts of this breed were raised and four mares bred for next year.

The dual purpose Shorthorn herd of cattle has increased in size and improved in uniformity. Several cows qualified for Record of Performance. Bull calves of this breeding were supplied to Manitoba farmers, but the supply was not equal to the demand for them.

Experiments in steer feeding to test the value of recleaned elevator screenings (Standard Stock Food) resulted in this feed giving much better results when mixed with bran than were obtained from oat chop. A test of sunflower silage indicated a feeding value equal to that of corn silage.

Breeding operations with Yorkshire and Berkshire swine have been continued. Experiments in hog pasturing have shown the possibility of materially reducing the cost of pork production by the use of pasture. Feeding experiments

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with recleaned elevator screenings have confirmed the results of former tests, proving the great value of this feed. Experiments in the housing of swine have been continued.

In sheep breeding, work with the Oxford Down breed has been continued, also a comparison of the use of Oxford Down, Shropshire and Suffolk rams on a grade flock of ewes.

Breeding operations with poultry have been continued with the Barred Rock and White Wyandotte breeds. By trap-nesting and breeding from the best layers, very useful egg-laying strains are being developed. One Barred Rock pullet laid 248 eggs in her first year and a pen of 25 hens averaged 198 eggs all round. A new poultry house was built to continue the testing of styles of houses. An egg-laying contest was started. Twenty pens were entered by Manitoba breeders. The contest started November 1st and is to be continued for the year.

The usual variety tests of cereals and forage crops have been made this year and data are available on the results obtained. Cultural experiments to bring out information on the best methods of conducting farm operations of all kinds have also been conducted, and much information has been accumulated. Sunflowers for silage were grown for the first time with good results.

The eight crop rotations which occupy the major portion of the farm land were continued and results from year to year are compiled and made available for the public.

Very full tests of varieties of vegetables were made and also some tests of cultural methods. Remarkable success in the ripening of tomatoes has been attained at this Station. The flowers, hedges and ornamental shrubs and trees continued to be a demonstration of the possibilities of home decoration and shelter under prairie conditions.

A farmers' picnic was held on July 8, but was not so well attended as on the previous occasion on account of bad weather and roads. Many others visited the Farm during the year.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The season of 1919 was abnormal in many respects. Seeding commenced on the 19th of April and was general by the 21st. At the end of May the crops were very promising. A period of hot weather, high winds and drouth followed, which cut down the yield of all crops considerably. The fall was very open until October 1, when a very heavy frost was experienced and winter set in almost immediately without any break in the cold weather. Grains were a fair crop but forage crops of all kinds were very light. The potato crop generally was badly hit by the early freeze-up.

LIVE STOCK.

Horses.

There are thirty horses on the farm and of these sixteen are pure-bred Clydesdales and the remainder are work horses and grade colts. Three pure-bred foals were raised during the year and two of them are very promising.

The cost of feeding a horse which is worked the entire year was found to be \$180.90 at present prices of feed. The cost of feeding a colt from weaning to three years was \$159.35.

Cattle.

Shorthorns.—The herd numbers seventy-two consisting of three stock bulls, eight bull calves and sixty-one females. Of these six females and one bull were purchased at the Dryden Miller sale of imported Shorthorns and by careful

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selection it should be possible to build up a very high class herd. Care will be taken, however, to retain the good milking qualities which the herd already possesses.

There is a very good market for all surplus stock at good prices.

An experiment was conducted during the winter to determine the feeding value of sunflower silage for milch cows as compared with corn silage. The results obtained show that the palatability and feeding value of the sunflower silage is fully equal to that of corn, the only limiting factor being the very stimulating effect the sunflower had on the kidneys.

The cost of feeding a cow during the lactation period has been found to vary from \$79.93 to \$134.74, depending on her milk production. The cost of raising a calf to one year was \$70.35; from one to two years the cost was \$42.50.

Grade Cattle.—Twenty steers were purchased for experimental feeding in the fall of 1919: They were divided into two equal lots and used to compare the feeding value of recleaned screenings (Standard Stock Feed) as compared with barley as the main grain ration for finishing steers. The barley showed superior gains and a lower cost per pound gain. The steers on barley made an average daily gain of 1.68 pounds at a cost of 17.02 cents per pound, and the ones fed on screenings made an average daily gain of 1.37 pounds at a cost of 18.79 cents per pound gain.

Sheep.—At present there is a flock of one hundred and eleven sheep, of which number thirty-nine are pure-bred Shropshires and the remainder grades with the exception of a pure-bred Oxford ram.

The grading up experiment has been continued using Shropshires and Oxford rams on range ewes and the results have been uniformly good, the second and third cross ewes closely resembling pure-breds in type, and the weight of wool being increased from five and one-half to ten pounds per ewe.

The cost of feeding a ewe for one year was found to be \$9.93, and of raising a lamb from weaning to two years was \$13.92.

Swine.—The swine herd is twenty-four in number and consists of one Yorkshire boar and ten sows, one Berkshire boar and two sows and ten feeders.

Owing to the peculiarities of the season the pasture experiments with swine were a failure and no results were obtained. The cost of maintaining a sow for one year was found to be \$28.34 and for raising a young sow from weaning to one year was \$23.59.

POULTRY.

Two breeds of poultry are kept on the farm, namely, Barred Plymouth Rocks and White Wyandottes. Special attention has been paid to egg production and utility type, all birds being trap-nested. The average egg production of the birds retained in the breeding flock was 172 eggs in one year. The value of these eggs at prevailing prices was \$6.04 and the feed cost \$2.30, leaving a profit per bird of \$3.74.

A laying contest was commenced during the year, twenty pens being entered by various breeders in the province. The birds will be trap-nested throughout the year and all birds laying over one hundred and fifty eggs recorded in the Record of Performance for poultry. Some of the pens are laying very well.

FIELD HUSBANDRY.

In field husbandry the work with rotations and cultural methods was continued, and also the variety test work with cereals and forage plants. Corn was a fairly good crop of excellent quality. Roots were a fair crop. Hay mixtures containing alfalfa gave comparatively high yields.

Small fruits yielded fairly well. Variety and cultural tests were continued with these and with vegetables.

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BUILDINGS.

Twenty new colony houses for poultry were constructed during the year. Ten of these were used to house the laying contest and the remainder for housing our increased flock.

EXHIBITION AND VISITORS.

Exhibits of live stock and poultry were made at the Regina summer and winter fairs, the Swift Current poultry show and the Sintaluta fair. At the Regina summer fair, the only show to which a competitive exhibit was sent, one Clydesdale mare was Canadian-bred champion and another reserve grand champion.

EXPERIMENTAL STATION, ROSTHERN, SASK.

The season of 1919 was characterized by lack of moisture, high winds and drifting soil, which worked disastrously on grain and hay crops and most of the hoed crops. These conditions left a serious feed shortage not only for the Station but for the whole province. The field experiments were so ruined that no reliable results could be deduced from variety tests nor from cultural methods. With respect to soil drifting it was found that soil that had been heavily manured within the past six years, or which had not been longer than six years from sod did not drift, and that the effect of a windbreak was such as to protect the soil from drifting for a distance of fifty feet for every foot in height of the windbreak.

The garden was the best it has ever been, due, no doubt, to repeated heavy applications of manure for the past eight years and to effective windbreaks.

There were three colts raised last season and one mare died, leaving on the Station sixteen horses, two two-year-old colts and three yearlings.

The cattle at the Station consist of 12 pure-bred Holsteins and 12 grade Shorthorns. The flock of grade sheep is kept down to approximately one hundred and by the use of pure-bred Leicester rams is much superior to what it was in 1915. The gross sales of wool, pelts and mutton for the past four years amounted to \$4,659.

From 10 brood sows there were raised 68 pigs to maturity. These were on an experiment in which the self-feeder showed up to good advantage.

A start was made in poultry in 1919 by obtaining eggs of a bred-to-lay strain of Plymouth Rocks from Indian Head Experimental Farm. From about three hundred hatched there were 128 pullets selected as a foundation flock. There were six colony houses and two permanent hen-houses built.

EXPERIMENTAL STATION, SCOTT, SASK.

The season of 1919 was unusually warm with insufficient rain during the early summer months. There was only a total of 3.33 inches of rain from April 1 to July 31, and following two dry seasons, crop yields were light. There was practically no damage from soil drifting on the Station and little in the immediate vicinity, but in many districts there were serious losses from this cause.

Gathering data on the cost of horse labour and cost of feeding horses has been continued. A steer feeding experiment showed sunflower ensilage to be worth \$13.81 per ton when used in feeding steers. The sheep have again shown substantial profits, averaging $9\frac{1}{2}$ pounds of wool and $1\frac{1}{4}$ lambs per ewe for the hundred breeding ewes. Notwithstanding the high cost of feeds, swine feeding experiments have shown profits. A comparison of the self-feeder with the open-trough method of feeding has been continued and the value of pasture for swine is being determined.

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The work with poultry has included a comparison of hens with pullets for egg production and fertility of the eggs. Barred Rock and Orpington breeds have been compared, and hot-water and hot-air incubators have been tried out.

The value of the crops from the several rotations has again been determined. In the soil cultural experiments some interesting data on the best methods of seeding down and the value of the soil packer have been secured. Rates and dates of seeding have shown early seeding and light seeding the most profitable for seasons such as the past.

The yields of cereals were low but the sample harvested was fairly good. Later maturing varieties such as Red Fife and Kitchener wheats and Banner oats gave the best yields. Red Fife withstood the spring frosts with less damage than any other variety. Hannechen barley and Prussian Blue peas gave good returns for the season. This is the first year the former has been tried out on this Station. Flax was thinned out by early June frosts and yields from fall rye were decreased from frost damage while the rye was in the flowering stage. Spring rye gave good returns.

Considerable attention has been given to forage crop experiments. A new set of tests of grasses and clover plants was started. A small field of sweet clover was sown and an experiment to determine the possibility of sowing sweet clover with a nurse crop started. Silage crops grown included sunflowers, oats and corn.

Extensive tests of strains of field roots were made. Varieties recommended and sold by the several western seed firms were grown in the tests and compared with roots grown from seed raised on the Experimental Farms' system.

A number of native plums planted in 1914 bore their first fruit this season. Small fruits gave promise in the early spring of an abundant crop, but about fifty per cent of the flowers were frozen just as the fruit was setting. Vegetables gave good returns and the potato crop an average yield, but, owing to the rains coming late, the tubers were unshapely and immature.

During the year a poultry-house, piggery and silo were erected. An exhibit was shown at a number of the summer fairs.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

The season of 1919 was the driest ever experienced in the Lethbridge district since meteorological records have been kept or since farming has been attempted. The total precipitation from April 1 to July 31 was only 3.84 inches. The first work on the land was done April 2. Grain crops were seeded in good season and made a nice start but the dry May, followed by a warm June and July, when hot dry winds were prevalent, made satisfactory growth impossible. All crops on dry land were a practical failure; even grain sown on summer-fallowed land in many cases did not develop sufficiently to make harvesting possible.

Keen interest has been developed in irrigation throughout the southern part of the province due to the three very dry seasons just passed, in consequence of which the superintendent attended many farmers' gatherings and addressed them on questions connected with irrigation.

As usual, most of the field experimental work was conducted in duplicate on the irrigated and non-irrigated parts of the Station. On the former the yields of all crops were satisfactory. The yields of alfalfa hay were particularly good on account of the hot weather during the long, dry season. The highest yield of wheat was the "Pioneer," 52 bushels, 30 pounds per acre; "Danish Island" oats gave 163 bushels, 30 pounds per acre; "Bark's" barley gave 101 bushels 12 pounds per acre. "Golden Vine" peas gave 28 bushels per acre. All classes of forage crops produced well on the irrigated part of the Station but were a

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failure on the non-irrigated part. Sunflowers made a particularly good showing and demonstrated the possibility of getting a large and satisfactory tonnage from this new forage plant.

The tests of the carrying capacity of different pasture grasses and mixtures on the irrigated land were continued. From the flock of 98 ewes 132 lambs were reared and cost data on the same were obtained. Four of the work mares foaled.

Tests carried out indicated that April was the best month to hatch pullets for winter layers. Trap-nesting of all the pullet stock was continued. Out of 150, thirty-eight produced over 200 eggs for the year and 90 of them produced over 150. In the spring of 1919 there were hatched 915 chicks. All the better cockerels were disposed of to farmers for breeding purposes and the demand, as usual, was greater than the supply. During the four winter months of 1919-20 the best pen of 55 pullets averaged over 70 eggs each; several of them produced over 100 during this period. The cost of production was twenty-five cents per dozen with feed at prevailing prices. A laying contest was begun November 1, eleven pens being entered.

The work carried on with bees during the past year was quite successful. Two colonies were wintered in a "dug-out" cellar and came out in excellent condition. Two 2-pound packages of bees from Alabama were received May 10. One of the wintered colonies and one of the purchased ones were used for division to increase the number of stands. The other two colonies were used for honey production, 407 pounds of extracted honey being obtained from the wintered one and 281 pounds from the colony made up from the 2-pound package of live bees. The two colonies used for division produced five strong colonies before winter set in besides yielding 152 pounds of extracted honey. The season's returns, confirming previous tests, indicate the excellent possibilities of profit in beekeeping in the alfalfa-growing districts in southern Alberta.

A fair quantity of crabapples was produced on some of Dr. Saunder's cross-bred varieties. A large number of plum trees bore fruit, these being all selected seedlings of the native plums of Manitoba. The vegetable garden on the irrigated land produced well, but on the non-irrigated land the results were disappointing. All ornamental trees and shrubs wintered well.

EXPERIMENTAL STATION, LACOMBE, ALBERTA.

The first seeding done in the season of 1919 at this Station was on April 19. A moderate amount of moisture had been supplied to the soil by light rains, and a snowfall in early May, while delaying seeding, supplied further moisture. The summer was exceptionally dry, especially during the months of June and July, and the precipitation, which totalled 16.683 inches, fell, for the greater part, out of the growing season. Consequently the usual rank growth of straw and hay was not secured, but average yields of grain were obtained. Unfortunately, winter set in on October 20, before many farmers had any fall ploughing done, and has been an exceptionally trying one on the live stock.

No experimental feeding was done with horses, but records of costs were kept. Idle horses were wintered very successfully outside in the shelter of trees, with a supply of good prairie hay and oat sheaves. The cost per head per day to winter was 26.9 cents.

The dairy herd is now composed of 36 pure-bred Holsteins and 18 grade Holsteins. The average record of milk production was 7,939.9 pounds per cow. A good quality Cheddar cheese was manufactured, which brought the average return per cow to \$216.54.

The beef herd, which comprises 47 pure-bred Angus and 7 grades, has made a satisfactory showing during the year. Many good individuals are

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included in this herd, and an 18-months-old steer won first in his class and reserve championship at the Alberta Winter Fair, Calgary.

The second year's work in the grading-up experiment with sheep was most successful. Rams of Shropshire, Oxford, Hampshire, Leicester, Cheviot and Corriedale breeding were bred to common grade ewes. The progeny, both lambs and shearlings, were carefully weighed, wool samples taken and graded, and the weights of the fleeces recorded.

Feeding tests with Yorkshire, Berkshire and Duroc Jersey swine were carried on as well as experiments with self-feeders and various pastures. Alfalfa, rape, oats and fall rye pastures gave good returns in the form of pork. The cost of carrying a mature sow over the winter was found to be \$3.90 per month.

A very successful year with poultry was experienced, the chickens hatching out well, and the demand for stock and eggs was keen. Trap-nesting was carried on, and the cost of egg production recorded.

The season was not altogether favourable for honey production, owing to a scarcity of honey plants, but an average yield of 64 pounds of honey from each hive was obtained.

Records of costs and returns were tabulated from four different rotations. Experiments with various cultural operations, varieties of grain, and hay and pasture mixtures were conducted on over 650 plots. Marquis wheat yielded 45 bushels 10 pounds per acre, while Ruby Ottawa 623 yielded 43 bushels. Banner oats, with a yield of 114 bushels 24 pounds per acre, stood first in the list, as it also does in a five-year average. Victory held second place. Barks barley, yielding 76 bushels 42 pounds, held its usual premier position. Grass plots sown either in mixtures or singly to timothy, Western rye grass, Awnless Brome, Meadow Fescue, Kentucky Blue grass and alfalfa gave the best returns. Heavy yields of oats for ensilage, and of sunflowers were put into the silos in good shape. The root crop was a failure, owing to the dry season and cutworm attacks.

Small fruits yielded well, and a few plums and apples set on new trees in the orchard. A good crop of hardy vegetables was harvested. The annual and perennial flower borders, hedges and trees were much commented upon by the numerous visitors.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

The season of 1919 was most unfavourable to plant growth. The spring was cold, rainfall very low, and water could not be turned on in the municipal ditches until May 15 owing to repairs which had to be carried out after the frost had gone.

Comparative tests were made in feeding a herd of 25 beef cattle in three pens of 7 each and 4 stall fed. All made excellent gains and fair profits. Experimental feeding was also carried on with sheep and swine. The year was fairly successful in the divisions of poultry and bees.

The fruit trees made slightly less growth than desirable owing to insufficient moisture; in seed production, owing to the same reason, some of the plants failed to mature their seed. Some good work was done in the selection of pepper, tomato and cucumber seed.

The yields in the division of cereals were low, the straw was short and the grain in many instances was small and shrivelled. In the division of forage plants good progress was made during the year. Tests of varieties of mangels, corn and various other plants were carried out.

During the year a foreman's cottage and a boarding-house have been erected, also a log-shelter for visitors. An exhibit was shown at eight of the provincial fairs during the year.

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EXPERIMENTAL STATION, INVERMERE, B.C.

The past season has been rather an unusual one in that practically every month had extremes one way or the other. On the whole there was considerably less rainfall during the growing season than any previous season since the Station was started. The ground was in good condition when the seeds were sown, but growth was relatively slow, as May and June were quite cool, there being three frosts in June. Early in August there was a heavy rainfall which helped the crops materially and brought them along to harvest.

No experimental work with horses or cattle has yet been undertaken, but some figures on wintering brood sows are being collected.

In field husbandry some very creditable results have been obtained on the irrigated rotations, while on the dry land the crops were a failure. Mangels, sugar-beets and carrots were severely damaged by the cutworms. Alfalfa, clover and the grasses gave large yields.

Excellent results were obtained with the cereals this past season and field peas gave record yields, the average yield per acre of the five varieties under test being over 60 bushels. Prussian Blue variety was the highest, with 89 bushels per acre.

Horticultural work is progressing very favourably. A large number of varieties of vegetables and flowers are being tried out. Bush fruits gave a high yield and some of the young apple trees promise well. Potatoes did remarkably well, ten varieties yielding from 20 to 25 tons per acre.

On the poultry plant, Barred Rocks, White Wyandottes, and turkeys are kept. Pedigree trap-nesting and breeding are carried on. Last year a small pen of Wyandottes laid an average of 227.7 eggs per hen and showed a profit over feed of \$6.32, while a pen of 50 Rocks gave a profit of \$3.45 per bird. The demand for stock and eggs was greater than the supply.

In the apiary, seven colonies came through the winter of 1918-19, and during the season produced an average of 126.4 pounds of extracted honey, the largest yield from one colony being 234 pounds. During the season the seven colonies were increased to eleven, and on March 23, 1920, when they were examined, they had come through the winter successfully.

An exhibit was shown at six provincial fall fairs during the season and attracted considerable attention and favourable comment.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The months of April and May, 1919, were cool, damp and cloudy, resulting in an unusually late spring. Very little work on the land was accomplished in April and when the seed was finally sown the cool temperatures retarded growth. Up to the end of June hay and pasture crops did remarkably well under these conditions but cereal, corn, root and potato crops were late. Following the late spring came a very dry summer so that although the first crop of hay yielded exceptionally well and was saved in excellent condition, the second crop of hay and the late pastures were poor. The cereal crop ripened too rapidly for heavy yields. Owing to dryness the root and potato crops were light. In many districts an early frost injured the fodder corn.

A very nice group of Clydesdale females, consisting of four mature mares, three yearling fillies, and one filly foal, is on hand. There are also ten grade Clydesdales and a driver. Figures on the cost of horse maintenance are being compiled.

Because of the shortage of accommodation, the size of the dairy herd has not been increased. The herd numbers 72 head: 49 of these are pure-bred and 23 grade Holsteins. Some very nice long-distance records were completed. Agassiz Pietje Korndyke was the best four-year-old, her sister Agassiz Priscilla

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Korndyke the best three-year-old, and Aurora Mechthilde the seventh prize mature cow in the Holstein Record of Performance. These three females won more R. O. P. prize money last year than any other herd in Canada. It is gratifying to note that the herd has passed the seventh year without a reaction to tuberculosis. The experimental feeding and the manufacture of cheese have followed much the same course as that of last year.

The flock of Dorset Horned and grade sheep is giving good results. Ten lambs, the oldest one born January 12, were sold the last of March for the Easter market. They brought \$17.60 each. This branch of the sheep business promises a bright future. Eighty-one fleeces, totalling 647 pounds, were sold for 53 cents per pound.

With swine, the experimental work consisted of comparisons of the self-feeder with trough-feeding and varying quantities of skim-milk against no milk and milk substitutes.

To produce 100 pounds of pork the trough-feeding method cost slightly more than that of self-feeding and, when the labour question is considered, the advantage of the self-feeder may be still further emphasized.

In the feeding of varying quantities of skim-milk, the most profitable returns were obtained from pigs fed at the rate of 8 pounds of skim-milk per pig per day added to a ration of 1 part oats, 2 parts screenings and 3 parts shorts. Others fed 6 pounds skim-milk each per day added to the same standard ration came second in order of profit, while those fed 10 per cent tankage added to same standard ration proved tankage to be a valuable substitute for skim-milk when fed at this rate but not if fed at as high a rate as 20 per cent. Satisfactory results were not obtained when feeding the above standard ration with neither skim-milk nor substitutes.

In the poultry department three varieties are kept, Barred Plymouth Rocks, White Wyandottes and White Leghorns. Several of the pullets of each variety laid over 200 eggs during the year. Plenty of green feed in the form of kale, rape and mangels fed in the fall and early winter proved of great value in the ration for producing winter eggs.

Work in the forage crop section consisted of growing seven acres of mangel seed besides testing 37 plots of mangels, 24 of carrots, 4 of sugar-beets and 12 of fodder corn. In cereal work 13 varieties of barley, 10 of oats, 6 of peas and some mixtures were grown.

In the orchard plums and cherries gave a very heavy crop but apples and pears only a small crop and that indifferent in quality. Small fruits yielded heavily. All vegetable crops were fair and the roses and other flowers were excellent.

A new horse barn, also a new office were erected. Underbrushing the remaining uncleared area on the east side of the Farm was completed. Four acres of land that had previously been underbrushed were stumped, levelled, ploughed and put in readiness for sowing.

EXPERIMENTAL STATION, SIDNEY, B.C.

The conditions governing growth were favourable to established plants; annuals did not do well owing to summer drouth that was general over the island district. Autumn-sown crops and hay gave good yields. Small fruits, orchard fruit, and garden seed crops all gave excellent yields.

The poultry breeding work progressed favourably, culminating in the production of the highest producing family of White Wyandottes in the world. Considerable expansion was provided for poultry breeding. The regular work in experimental breeding, feeding and record keeping was carried on with Jersey cattle and Berkshire swine.

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The experimental orchard made fair development and produced some excellent fruits of varieties quite new to Canadian horticulture.

The field husbandry work gave good returns from various rotation crops, and excellent yields were obtained in both grain and fodder.

The soil improvement work carried on consisted of removing roots and stones and tile draining.

The publicity work consisted of an exhibit shown at the larger fairs in the province.

The cereal and forage crop work carried on during the year consisted of extensive variety tests, selections and hybridization.

The work in horticulture was successful to the extent of producing 2,500 pounds of excellent garden vegetable seeds, and the obtaining of considerable valuable data on this line of work, which is new to the district.

The apiary gave an average surplus of 100 pounds per colony.

Some building repair work was done. One house to be used as a residence was erected, also a small pumphouse, two poultry-houses, a shed and a 20-foot extension to the dairy barn.

SUBSTATIONS.

Experimental work was continued at Fort Vermilion, Forts Smith, Resolution and Providence, Grouard and Beaverlodge in Alberta; at Swede Creek, near Dawson, in the Yukon, and at Salmon Arm, B.C., and further data were obtained as to the agricultural possibilities of these districts. It is proposed to issue, during the coming year, brief bulletins on the results so far obtained at Fort Vermilion and at Beaverlodge.

HEALTH OF ANIMALS BRANCH.

The work of this branch is limited to the administration of the Animal Contagious Diseases and the Meat and Canned Foods Acts and regulations passed thereunder, and is of a most important and far-reaching character, including, as it does, the protection of our live stock interests, our foreign markets and our export food trade. This work is of a highly technical nature, and as it frequently interferes with business interests, the exercise of tact, diplomacy and good judgment is required on the part of my officers at all times.

More or less difficulty has in recent years been experienced in maintaining an adequate and efficient force, owing to the scarcity of suitable and properly trained veterinarians. This is a serious situation, in view of the fact that the work is rapidly increasing, and there are many opportunities for investigational and research work, which, although of the utmost importance from an economic standpoint, cannot be undertaken until the trained help is available.

As the application of veterinary science is indispensable to our live stock interests, it is of the utmost importance that there is an available supply of modernly trained veterinarians. Our live stock is undoubtedly our most valuable asset so long as our herds and flocks are free from those serious diseases which sweep the older countries in epizootic form. An epizootic of any of these foreign diseases in this country would be a very serious matter indeed, as it would quickly transform this valuable asset into an alarming menace. It is consequently essential to maintain an adequate force of trained veterinary inspectors not only for the purpose of enforcing the regulations of this branch, but also for the purpose of prompt, efficient action in combating foreign diseases should they unfortunately be introduced into this country. Realizing the importance of preparedness, and in view of the shortage of veterinarians, the problem of encouraging suitable young men to enter the veterinary profession

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was discussed among other matters at a conference of provincial Deputy Ministers of Agriculture and other representatives held in this city on March 17, 18 and 19. It was suggested that the Provincial Governments could assist by offering scholarships for competition at the agricultural colleges, these scholarships to entitle the winners to attend a recognized veterinary college. This suggestion met with the approval of the conference, and I, therefore, hope that if it is carried out by the provinces, it will be the means of inducing not only the winners of these scholarships, but also other agricultural students to take up the study of veterinary medicine.

The standard for veterinary education has in recent years been materially elevated. It is now necessary for the student to pass his junior matriculation before he can enter the only English veterinary college in this country. He must then attend college for four years before he can graduate. These requirements, while in my opinion quite necessary, have nevertheless a deterring influence, owing to the fact that the veterinary profession does not offer the same financial returns as its sister professions. As the services of highly trained veterinarians are invaluable in an agricultural country, the young man who enters the veterinary college to-day, under its improved status, may expect better opportunities in the future with larger financial returns for efficient service.

It has been necessary to exercise the greatest vigilance during the past year with regard to overseas importations. Many of the countries of Europe have been experiencing very serious epizootics, and while, owing to the prevalence of these dangerous diseases in Europe, live stock importations have not been permitted for many years, there is always a possibility of infection being introduced through the channels of commerce.

Shipments of hides have been continually arriving on this continent from foreign sources, and it has been necessary to regulate these shipments as far as practicable. The importation of these hides is prohibited, unless they are accompanied by certificates from reliable sources stating that the hides have been procured from animals free from contagious diseases. Shipments not accompanied by these certificates are held at the landing port until arrangements are completed for their disinfection at points where suitable facilities exist. The importation of these hides is undoubtedly a source of danger, but as it has assumed large commercial proportions, it is necessary to exercise caution in its control. In view of the great difficulty in carrying out effective disinfection of hides, owing to injury and to the interference with tanning operations, the Veterinary Director General is conferring with the tanners with a view to recommending suitable and practical measures for our protection in this connection.

I regret to report that foot and mouth disease has again been causing very serious losses in England. Outbreaks have occurred at frequent intervals, extending from the Isle of Wight to the northern counties. It has, therefore, been necessary to prohibit all cattle, sheep, other ruminants and swine being imported from that country for some time. In view, however, of the great importance of permitting our breeders to import animals of special breeding, and owing to the fact that Scotland has not at any time had the disease within its boundaries, importations are being allowed from Scotland, provided the animals have been in that country for a period of two months previous to their embarkation.

The prevalence of rabies in England has also necessitated the taking of suitable measures to protect this country from the infection of this very serious disease. The importation of dogs has, therefore, been prohibited, unless such importations are accompanied by certificates signed by officials of the British Board of Agriculture, stating that the dogs have come from a rabies free area and that they have not been exposed to the infection of rabies for a period of six months prior to importation.

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In the minister's last report reference was made to conditions following the recent war which would very materially increase the danger of introducing into this country serious foreign diseases and it was stated that the importation of horses known to have been in continental Europe was prohibited. Although these restrictions were in force one hundred and ten (110) remounts, the property of officers of the Militia Department, arrived at the Atlantic seaboard on the steamships *Dominion* and *Tacoma* in the months of June and July, before I assumed charge of this department. I understand that these shipments arrived without authority but were permitted to land under certain conditions. The horses were removed under official supervision to the old British Remount Depot at Dixie. These premises were placed under quarantine and the horses were isolated thereon until March 15, 1920, when they were released and turned over to the Militia authorities. The expenses in connection with the care and feeding of these animals were borne by that department.

All possible measures were taken by my officers to prevent any possibility of disseminating infection in case any disease was found to exist. Visitors were not permitted to come on to the quarantine grounds, and in order to enforce this ruling watchmen were kept on guard at all times. The danger which exists in importations of this kind was amply exemplified in the fact that it was necessary to destroy several of these horses for Ulcerative Lymphangitis, a foreign disease which became widely scattered throughout Europe during war operations. This disease had not previously been detected in this country, and if precautionary measures had not been taken and the horses had been distributed throughout Canada, my department would undoubtedly have been confronted with a very serious situation.

Although my department has on more than one occasion been criticised for enforcing too rigid regulations in connection with the importation of stock from foreign countries, I am of the opinion that too much care cannot be exercised with regard to these importations. There are many very serious diseases prevalent in foreign countries, to the infection of which our stock has never been exposed. Canadian animals do not, therefore, possess active or passive immunity against these diseases, and if the infection were introduced there would be every probability that the epizootic would extend from coast to coast and decimate our animal population. In view of this fact it is essential to prohibit importations from countries where serious diseases are known to be prevalent, although I appreciate the necessity of importing valuable strains of various breeds to improve our herds and flocks. As a further precaution it is necessary for the importer to obtain a permit from my department for the importation of animals from any part of the world except the United States and Newfoundland. Applications for permits are carefully considered and are only granted for shipments coming from countries free from serious contagious diseases.

A quarantine system is maintained on our Atlantic and Pacific seabords for the purpose of detaining animals under observation for a suitable period, to ensure their freedom from disease before they are permitted to come in contact with Canadian animals. The most important quarantine stations on the Atlantic seaboard are situated at Quebec, St. John, N.B., and Halifax, and on the Pacific seaboard at Vancouver and Victoria. An experienced veterinarian is in charge of each station and it is his duty to keep a careful supervision over the animals at all times while in quarantine. Suitable accommodation is provided free of charge for these animals, but the department does not assume any responsibility for their feeding and care while being detained. The importer must make his own arrangements in this connection.

Outbreaks of contagious disease in this country are given prompt attention by a well-organized staff. The statistics for the year 1919-20, which are out-

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lined in the special report of the Veterinary Director General, show a very favourable condition of affairs with regard to contagious diseases.

GLANDERS.

This disease has in the past given my department a great deal of anxiety and trouble, and it has been necessary to enforce an aggressive policy involving compulsory slaughter of all animals reacting to mallein, for which compensation has been paid. A rigid enforcement of this policy has practically eradicated this very serious disease of horses, mules and asses. During the past fiscal year glanders has only been detected in the provinces of Manitoba and Saskatchewan. The outbreaks in these provinces were quite limited and were quickly controlled, involving the slaughter of approximately sixty horses.

Special care is taken to prevent the introduction of infection from foreign sources, and suitable regulations are strictly enforced in connection with these importations.

DOURINE.

Only two horses were destroyed for this disease during the past year. These animals did not manifest any symptoms of the malady, but the laboratory tests, while not positive, were not satisfactory, and in view of the insidious nature of this disease the animals were slaughtered.

Our investigations and laboratory blood tests of samples taken from thousands of horses indicate most conclusively that this disease has at last been eradicated. The eradication of this disease has only been accomplished through the enforcement of some radical measures, which were at the outset very strongly opposed by the horse breeders.

When this disease was first discovered in southern Alberta there was no satisfactory method for diagnosing the latent cases. It was, therefore, necessary to prohibit entirely breeding operations over a large area and to keep many large ranches under quarantine for very long periods. As this procedure caused a great deal of opposition, which seriously interfered with the control of this malady, it was necessary to establish a quarantine station in the infected area for the purpose of conducting research work, with a view to obtaining a more satisfactory method of diagnosing these cases. Fortunately Dr. E. A. Watson was able, after close application to research work at this station for a considerable period, to perfect a laboratory method for making a quick and satisfactory diagnosis. As soon as this method was adopted the department made very rapid progress in controlling this disease, which was rapidly ruining the horse breeding industry in the west. It was necessary to slaughter a very large number of horses showing no outward symptoms of the disease. The post-mortem results, however, confirmed this method of diagnosis, and as a result it has been possible, after many years of diligent work, to eradicate this disease.

HOG CHOLERA.

This highly infectious disease has been dealt with during the past year in each province, except New Brunswick, Prince Edward Island, and Quebec, also the Yukon Territory. In the province of British Columbia, however, only 84 hogs were destroyed for this malady, while the largest number was slaughtered in the province of Ontario.

Fortunately this disease has not been as prevalent as in the past. The policy of supervising the feeding of garbage to hogs and the enforcement of regulations requiring the thorough cooking of this material before being fed, has, I think, had a beneficial effect in preventing outbreaks. The policy of immunization with serum and virus, which is largely followed in the United

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States, has not been necessary in this country. Although a few herds have been so treated, these have been exceptional cases, and experience has shown that my department would not be justified in extending this practice.

MANGE IN HORSES AND CATTLE.

Only a few limited outbreaks of horse mange have been detected in Canada during the past year, and these outbreaks have been eradicated without any undue trouble.

Cattle mange has been limited to the provinces of Alberta and Saskatchewan, but it has given this department a great deal of anxiety for many years. Our statistics, however, show that progress has been made in cleaning up localities, but the infected area in these two provinces is so large that the general situation is materially unchanged.

The policy of this Department in placing a blanket quarantine over this large area many years ago was a wise procedure, and there is no doubt that it has prevented the dissemination of this disease throughout this country, and has also been the means of retaining for our live stock men the United States market. Even though all possible precautions are taken to prevent infected cattle leaving this area, shipments of affected animals have been detected from time to time in the United States market. Some of these shipments had been inspected at Winnipeg by officers of the Bureau of Animal Industry in addition to the inspection made by my officers. The inspection in question would undoubtedly be very carefully made, and although the inspectors were unable to detect any suspicious symptoms of mange the disease was detected in some of these animals upon their arrival at the United States destination points. As a result, the United States authorities, during the past summer, refused to accept Canadian cattle. The situation was quite serious and the Veterinary Director General visited Washington and discussed the whole matter with the Chief of the Bureau of Animal Industry. The United States authorities, however, would only consent to permit the importation of Canadian cattle going south from Winnipeg under the following conditions:—

Separate yards to be maintained in the St. Boniface stock yards for all cattle coming from the mange area, also separate yards for all cattle coming from outside points, accompanied by the required district health certificates, and separate yards for cattle from outside points arriving without these certificates.

They further refused to accept shipments of cattle from the mange area pens, pointing out that under the Act of Congress the importation of cattle into the United States, which had been exposed to infection of a contagious disease within sixty days prior to shipment, was absolutely prohibited. While the United States authorities would not accept cattle from the mange area going south from Winnipeg, under this system they accepted cattle coming from outside that area which were accompanied by the necessary certificates. The situation was serious, but it was necessary to arrange matters in Winnipeg in accordance with their ruling, as otherwise practically all our western export cattle trade would have been stopped. A peculiar situation resulted, owing to the fact that while shipments from the mange area arriving from Winnipeg were refused admission into the States, the American officers were permitting similar shipments at other western points, such as North Portal and Coutts. In view of this fact my officers did not refuse to issue certificates for shipments of export stock from the mange area whenever this was possible. Unfortunately this action on the part of my officers caused a great deal of dissatisfaction among the stockmen, owing to the fact that in cases where the routing of these shipments

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was changed via Winnipeg instead of via North Portal or Coutts, the cattle upon arriving at the St. Boniface stock yards were not permitted to proceed south to the United States. This dissatisfaction became much more apparent and I considered it advisable to call a conference of all representative stockmen in Calgary during the month of December. It was my intention to be present at this conference, also the deputy minister and the Veterinary Director General. Unfortunately Dr. Torrance was not able to attend, and at the last moment I found a large deputation arriving in Ottawa to discuss important matters with me, which prevented me going also. The deputy minister and Dr. Hilton attended the conference, at which representative stockmen from all parts of the mange area were present. I also considered it wise to arrange for all the veterinary inspectors engaged in mange work to attend this conference.

All phases of the mange situation were discussed. The department's efforts to eradicate this disease for the past twenty-five years were reviewed and the stockmen were shown that they had failed to assist and co-operate with the department in the dipping of their animals. It was shown that at times when compulsory dipping was in force a very large number of cattle were not brought to the vats for a second dipping and that this neglect on the part of the stockmen was very largely the reason why mange was still found throughout this area. Some of the stockmen frankly admitted that they had neglected their duty in this respect, but stated that they were now willing to co-operate fully with the department and to see that all the other stockmen did so also, provided, however, that the department would remove the blanket quarantine as soon as dipping was completed.

The difficulties in connection with dipping such a large number of animals in such a large area, under such varying conditions, were very fully explained and the stockmen were advised that if they would assist the department to enforce satisfactory dipping under a compulsory order during a given period, the blanket quarantine would be removed and the department would then deal with individual outbreaks as a separate and independent quarantine. This decision was well received and the stockmen gave their assurance of full and hearty co-operation. It was, therefore, unanimously agreed that the department should enforce a compulsory mange dipping order at a suitable date, and I have just recently decided to have this compulsory dipping enforced from June 24 to July 5, 1920, this period appearing to be the most satisfactory to all concerned.

My officers in the mange area have been working persistently and conscientiously during the winter months in an endeavour to ascertain what particular districts are actually free from mange, as it is important to restrict the compulsory mange dipping order to as small an area as possible.

I was very glad to be able to sign an order, which became effective on March 30, 1920, considerably reducing the mange area.

It is very fortunate that this conference was arranged, as it was the means of urging a better understanding between the stockmen and my department. Energetic measures have been taken, and are still in progress, to organize the various districts for the compulsory dipping. The area has been divided into numerous small districts, in each of which a committee of stockmen have been chosen and special work assigned to them with regard to dipping operations. These committees are working in close co-operation with my officers, and individuals on each committee have been assigned to special work before dipping commences and during the progress of dipping. I have, therefore, every reason to believe that a most thorough roundup of all cattle in the area will be made, and that the dipping will be carried out under the most favourable circumstances.

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I fully appreciate the responsibility resting upon my department in the removal of the blanket quarantine, as this will throw open a very large territory and permit the indiscriminate shipping of all cattle in that area. As it is essential to prevent diseased animals arriving at our American markets, it will be necessary to exercise a close supervision over the old infected area for some time, with a view to placing special quarantines wherever any suspicious symptoms of the disease may be found.

SHEEP SCAB.

This troublesome disease of sheep is fortunately very rare in this country. Outbreaks during the past year have been dealt with in the province of Manitoba, but these outbreaks have occurred in districts in which the disease was discovered a year ago. The outbreaks, however, were limited in number and were promptly controlled, and I trust that the disease will be eradicated with the spring dippings.

A few outbreaks of this disease were also discovered in the province of Saskatchewan, and in each instance the infection was introduced by sheep shipped from districts in Manitoba in which the disease was later found.

In order to protect our flocks from the introduction of infection from outside sources, all sheep imported from the United States, with the exception of those for immediate slaughter, are held at the boundary port for a period of thirty days, unless they are accompanied by a satisfactory dipping certificate signed by an officer of the Bureau of Animal Industry.

TUBERCULOSIS.

In view of the wide distribution of this disease and its chronic tendencies in cattle, no compulsory measures are being enforced in an endeavour to control and eradicate it. The importance of taking suitable measures cannot be too strongly emphasized, especially so as the disease is gradually increasing in this country. The Meat Inspection statistics show that it has increased from 2 to 3 per cent in cattle and from 4 to 8 per cent in hogs. There are, however, so many difficulties in the enforcement of effective measures to control this disease, that before active steps can be taken it is essential to obtain the hearty co-operation of all live stock men. While there is no doubt that many of the intelligent live stock owners realize that something must be done to control this disease and are quite willing to assist in many measures which may be enforced, there is nevertheless a much greater number who are not at all in sympathy with the taking of active measures.

The Municipal Tuberculosis Order, which was passed a number of years ago, and which provides for material assistance to any municipality from this department, has not been taken advantage of to any great extent. It was found necessary three years ago to amend this order, owing to the fact that many dairymen objected to having their cattle tested with tuberculin. Municipalities can now obtain the assistance of the department under this order, provided that the milk from cattle, whose owners object to the tuberculin test, is properly pasteurized.

The United States pure-bred breeders a few years ago realized the necessity of controlling this disease and they appreciated the fact that unless some suitable measures were taken the live stock breeding industry would not make satisfactory progress. They, therefore, arranged for a conference with the Bureau of Animal Industry and the State officials and the question was very thoroughly discussed. It was finally decided to accredit the herds which were found to be free from tuberculosis after they had been tested by federal officials for a definite period. Committees were formed to study out this plan and finally it was

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decided to call it the Accredited Herd Plan. The federal authorities passed suitable regulations and this plan has now been in force for several years and has proved to be a practical plan, a workable plan, and a popular plan among the live stock breeders who are familiar with it.

There are at the present time in the United States over one thousand accredited herds of pure-bred animals, and there are a greater number of herds undergoing accreditation. As soon as the State authorities realized the value of this work they immediately passed more stringent interstate regulations to protect their own herds. The Canadian pure-bred breeders are now finding that it is a great deal more difficult for them to ship their animals to United States points than it was a few years ago. It was soon apparent to me that this department must inaugurate a similar plan and the necessary measures were, therefore, taken for the passing of suitable regulations for the Accredited Herd Plan in this country. These regulations became effective in September last and applications are being received regularly by the Veterinary Director General from owners desiring to have their herds placed under the supervision of the Department for accreditation.

There is a mutual agreement between the United States Government and my department, under this plan, that cattle from accredited herds can enter into either country without detention or test. This will be of inestimable value to our pure-bred breeders as soon as they are the owners of accredited herds.

Under the Municipal Tuberculosis Order and the Accredited Herd Plan compensation is paid for animals slaughtered under the supervision of a veterinary inspector and the owners also obtain in addition thereto whatever salvage they can procure from the carcass.

The department also takes charge of eliminating tuberculosis in the herds and maintaining such herds free from this disease. A compensation policy is not followed under this system, but the department supplies the services of its officers free of charge and all possible measures are taken to eradicate the disease in the herds placed under its supervision. The owners must remove all reacting animals promptly from the herd. These reactors are permanently earmarked by a veterinary inspector after which the owner can dispose of them as he sees fit, subject to the approval of the department.

The department also supplies a large number of doses of tuberculin free of charge to qualified veterinarians, upon the written request of owners, provided the veterinarians forward reports of each test on charts supplied to him for this purpose, and further that the owners hold all reactors on their premises until they have been permanently earmarked by one of my officers. This tuberculin is manufactured at the Biological Laboratory in Ottawa.

ANTHRAX.

This very serious disease exists only to a very small extent in Canada. Isolated outbreaks occur in the province of Ontario and Quebec in the same districts from year to year. The number of cases, however, during the past year were very much smaller than they have been for many years.

RABIES.

This disease has not been found to exist in this country at any time during the past year. In view, however, of the outbreaks of this disease in England during the past year, it has been necessary to prohibit the importation of dogs from that country unless accompanied by a certificate signed by an officer of the British Board of Agriculture and Fisheries, stating that the dog has come from a rabies free area and has not been exposed to the infection of rabies for a period of six months prior to date of shipment.

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FOXES.

The regulations with regard to the importation of foxes to Prince Edward Island are still being enforced and have, I believe, been the means of preventing the introduction of serious diseases among foxes, which would have interfered very seriously with the valuable fox industry. A large number of fatalities, however, did occur, principally among the young vixen, and it was necessary to send one of my pathologists to the island to conduct investigational work. It was found that the principal cause of the trouble was malnutrition.

In view of the great importance and value of this industry a suitable small laboratory is being equipped at Charlottetown where suitable research work can be conducted by the pathologist stationed there. I have also arranged to have suitable nutrition experiments carried on at our Research Station in Hull, and have secured the services of a nutrition expert to work in connection with the pathologist at that station in an endeavour to ascertain facts with regard to the feeding of foxes, which I trust will be of inestimable value to the fox industry.

LABORATORIES.

The Department maintains laboratories at Ottawa, Lethbridge, Alberta, and Agassiz, B.C. The Biological Laboratory at Ottawa is maintained chiefly for the purpose of microscopically examining the numerous specimens received for diagnostic purposes, as well as for the manufacture of biological products used for diagnostic and immunizing purposes.

The tuberculin and mallein used by our officers is manufactured at this laboratory, also a very large amount of blackleg vaccine, which is sold to stock owners at cost.

One of the pathologists at this laboratory is also devoting some time to research work in connection with contagious abortion, and live culture is now available for any live stock owner who may desire to employ a veterinarian to immunize his animals. I am given to understand that this vaccine is giving very encouraging results.

In view of the limited facilities at this laboratory, especially for research work, a suitable site was purchased two years ago on the Mountain Road in Hull. A laboratory has been equipped on this site and other suitable buildings have been erected. It is my intention to have the more important lines of research work carried on at this station. In view of the importance of conducting research work with serious contagious diseases my Department has gone to considerable expense to erect a fence around this station, which will prevent any possibility of infection being carried out of it by small animals.

The value to our live stock interests of properly conducted research experiments cannot be over-estimated. It is difficult, however, to find suitable and capable individuals to carry on this work, and it will be necessary, therefore, to select suitable young men who enter the service and to encourage them in this work, in order that it can be carried out to the best possible advantage.

The work in the laboratories at Lethbridge and Agassiz consists principally of the investigation of diseases peculiar to the provinces in which these laboratories are maintained. A great deal of the time of the pathologist at Lethbridge has been devoted to the examination of blood taken from suspected cases of dourine, while the pathologist at Agassiz is largely engaged in investigating the life-history of certain parasites, with a view to determining to what extent they may carry infection of contagious diseases.

Work has also been conducted at the latter laboratory in connection with plant poisoning.

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INSPECTION OF STOCK CARS AND YARDS.

An organized force of inspectors is maintained for the sole purpose of cleansing and disinfecting railway stock yards, corrals, chutes and stock cars, and in order that stock cars can be systematically disinfected from time to time an order has been in force for many years requiring all empty stock cars passing through certain definite points throughout this country to be held and disinfected at these points. This order has given very satisfactory results.

In addition to stationing car inspectors at the points mentioned in this order, as well as at other points where cars can be properly disinfected, a number of travelling inspectors are employed, who cover definite territories and supervise the work of the local men. The travelling inspectors also consult with the railway companies, with a view to making arrangements for this work and getting the co-operation of these companies. I am glad to be able to state that my department has experienced very little difficulty in enforcing its regulations with the transportation companies.

QUARANTINE STATIONS AND INSPECTION PORTS.

Quarantine stations and inspection ports are maintained on the Atlantic and Pacific coasts and along the international boundary. Suitable regulations are enforced with regard to the importation of all animals from foreign countries. Unfortunately it has been necessary to prohibit the importation of cattle, sheep, other ruminants and swine from any part of England, owing to outbreaks of foot and mouth disease in that country, and, therefore, the quarantine stations on the Atlantic seaboard have not been used to any great extent during the past year.

MEAT AND CANNED FOODS DIVISION.

The work of this division has been carried on very well considering the handicap experienced through the lack of a sufficient number of qualified inspectors.

The figures for the year show in the slaughter of cattle an increase of 126,000, in sheep of over 202,000, while there has been a decrease of 150,000 in the number of swine killed. The variety of diseases found on post-mortem has varied but little. The principal of these is tuberculosis. I regret to say that this disease continues to show a gradual increase but I trust that in the very near future it will be possible to develop a policy which will tend to its control and final eradication.

During the year a number of prosecutions were instituted concerning the sale of oleomargarine. It is unfortunate that so many dealers permit their greed for money-making to destroy their sense of honour and fair dealing to the extent that they transgress the law by misrepresenting their product and selling a food under a misleading name. This is particularly to be regretted in connection with the importation, manufacture and sale of oleomargarine, a produce permitted to be made and sold in Canada owing to the extremely high price of butter which has placed that food beyond the reach of the family of the ordinary individual. In connection with the different actions taken, convictions were secured and in the majority of instances substantial fines were collected. A rigorous policy of prosecution will be pursued against all those who continue to disregard the requirements of the law.

During the year inspection was granted to one or two oleomargarine plants, but for some reason best known to the proprietors these did not continue operations beyond a very short time. Our requirements regarding sanitation and

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equipment were such that they felt they could not comply with them consequently our inspectors were withdrawn and the plants closed.

In the month of November the packing-house in Chatham, Ont., was again placed under inspection.

A closer supervision of all our export meats has been inaugurated, in connection with which it is necessary to send our officers to outside points to reinspect and certify products that have been placed on outside storage waiting for transportation. This system of storage is not altogether satisfactory in connection with the handling of meats, yet owing to the fact that the slaughter of cattle is particularly heavy during the fall and the refrigeration accommodation at the packing-houses is not sufficient to hold the meats slaughtered and transportation facilities are inadequate, it is absolutely necessary that these foods be placed in properly refrigerated premises until such time as market and transportation conditions are satisfactory so that they may be exported. The completion of the new cold storage at Montreal, which will be modern and up to date, will to a great extent obviate the necessity for these meats being forwarded to storages in the United States. This will have the extra advantage of keeping such meats under the direct supervision of the officers of this division and their being at all times absolutely under Canadian control.

Early in the year a meeting of those engaged in the canning of fruits and vegetables was called in Toronto when the new standards for these products were discussed and agreed upon. In the past it was unfortunately too true that the label on this class of food was no indication of the contents of the tin. The idea of the new standards was in keeping with the requirements of the Act which distinctly states that the label placed upon such products must show a true and correct description. In order that there might be no misunderstanding regarding these matters it is now required that all such labels be forwarded for approval. This has entailed an immense amount of work for my officers, yet wonderful progress has been made. It has been impossible in all cases to adhere strictly to the regulations regarding labels as many millions of the labels were in the hands of the packers and some little time was given in order that a number might be used up in order to minimize their loss. However, it is expected that from this time on all labels used on products of this kind will convey to the purchaser and consumer a reasonable guarantee as to the contents of the tin.

The amendment to the Act of the year previous, governing imports, is beginning to have its effect. It was necessary, in order that imports might be controlled, to examine hundreds of samples of foods brought into Canada, with the result that a great many carloads were held on account of being improperly graded, and in different instances these held consignments were returned to the point of origin. Several shipments were also returned because of the fact that at the time of their entry into Canada they were unfit for food. This work of inspection is developing very rapidly, and with a little patience on the part of the public we hope to have it in such shape as will preclude the possibility of any unsound or improperly labelled food being offered for sale.

FRUIT BRANCH.

THE FRUIT SEASON.

The effect of several years of neglect of orchards in Ontario and the result of the unusually severe weather during the winter of 1917-18 continued to be in evidence throughout the season of 1919. Many orchards in the province of Quebec and a few in Ontario, which produced a crop of apples in 1918, had a heavy bloom in 1919, but shortly after the fruit had formed the leaves yellowed and both fruit and leaves dropped, and the trees died.

Weather conditions at the beginning of the season were considered favourable and, generally speaking, there was an abundance of bloom in all fruit-growing sections. In Nova Scotia and New Brunswick the weather was favourable during the blossoming period which resulted in a heavy set of fruit. In Quebec and throughout the apple-growing districts of Ontario the weather was cold, which retarded the bloom. Early varieties in Quebec were practically a failure, but with later varieties in both provinces, the set was fair and considerably greater than the previous year.

In the tender fruit districts of Ontario a mild winter was followed by a backward spring with an unusually heavy rainfall, which made it impossible for growers to get on the ground to apply the first spray which is necessary to control peach leaf curl; as a result many orchards were badly affected and produced little or no crop during the season. It is doubtful if there ever was a season in the Niagara peninsula when the blossom on nearly all fruits was greater, but unfavourable weather during the blossoming period resulted in a very poor set. Sweet cherries did not yield over ten per cent of a full crop; sour cherries were better and yielded approximately sixty per cent; plums were very light, estimated at not over fifteen per cent; peaches varied, in some districts a complete failure, in others a fairly good crop, on the whole about fifty per cent of an average crop; pears were approximately fifty per cent and grapes a full crop. The period of hot, dry weather greatly reduced the crop of raspberries.

In British Columbia weather conditions were favourable until the end of May when there were slight frosts which injured the first bloom, but the weather following the frosts continued cool and cloudy for about one week. During the first two weeks of June the weather was exceptionally favourable but turned cool with rain toward the middle of the month, and was very favourable for the balance of the month. All trees and plants made excellent growth. July was very hot and unfavourable to the growth of raspberries, which reduced the yield.

Nova Scotia gave promise of a crop of apples equal to or greater than that of 1911, which was approximately 1,800,000 barrels. A serious infestation of apple scab greatly reduced the quality of the fruit, especially the Gravenstein. During the early part of October there was a frost which chilled the apples severely, but apparently did no damage as the weather following was cool and cloudy; this was followed by a severe frost on October 20, and some apples in all sections were frozen solid and thousands of barrels were rendered useless. The crop as estimated by our chief inspector was practically 1,600,000 barrels, over 475,000 barrels of which were exported to the United Kingdom. An unusual feature in connection with the marketing of the Nova Scotia crop was the shipment of 587 cars to the United States, the greater proportion being bulk for the cider and vinegar factories.

Generally speaking, the prices obtained for all fruits during the 1919-20 season established a record. The high prices were no doubt due to the short crop and to the world demand for preserved fruits, together with the unprecedented demand for fruit syrups in the United States.

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FRUIT CROP REPORTS.

During the growing season the publication of the Fruit Crop Report was continued, but it was issued as "The Fruit and Vegetable Crop Report" in order to accede to numerous requests from growers and dealers who asked us to publish a report including crop estimates, prices, etc., of potatoes and onions as well as of all varieties of fruit. The reports gave in concise form, crop prospects and conditions in all parts of Canada, from June until October, inclusive. They also included summarized reports of crop conditions in countries whose fruit and vegetables come into competition with our Canadian-grown products.

Telegraphic Market Reports were issued simultaneously at Middleton, N.S., Ottawa, Winnipeg and Vancouver, throughout the marketing season, twice weekly during the period of heavy movement, and once each week thereafter. These reports contained the prices of all fruits grown commercially in Canada, and of some vegetables, and any items of special interest to facilitate marketing. Quotations were telegraphed by officers of the Fruit Branch located throughout Canada and, during the season when apples are exported, cablegrams were received direct from the Canadian Fruit Trade Commissioner in Great Britain.

THE BRITISH MARKET.

When it was evident that the crop of apples in Nova Scotia would be a large one and other fruit-growing provinces gave promise of fair to good crops, it was realized that there would be a sufficient quantity of second and third grade apples to export at prices to the consumers in Great Britain considerably lower than the control price fixed by the British Ministry of Food (67 s. 8 d. per barrel and 20 s. 10 d. per box). It was also realized that the demand for the better grades and varieties would be such that the price in an open market would be greater for them than the control price. Having in mind that the British Ministry of Food were interested only in apples as food and not in the better grade and varieties as such, an effort was made by the Fruit Branch to have the control removed, which would permit Canadian apples being sold on a free market. Our request received due consideration but was not granted, the reason being that the experience of the British Food Administration where the control price was removed had been very unsatisfactory, and it was deemed by them advisable to continue exercising control. As the home and United States markets were very attractive for the better varieties and higher grades, only a small portion of the first grade was exported. Our first opinion was supported by the prices received as the season advanced. While the market opened up strong, with increasing quantities, great weakness in the lower grades and poor varieties was noticeable, but it remained very firm for the better varieties and grades, which in many cases, even with No. 2 apples packed in boxes, brought the maximum control price. There is still some doubt as to whether the control will be removed for the coming season, but exporters generally are very desirous that it should be as they are prepared to compete on an open market with the product from other countries.

AUSTRALIAN EMBARGO.

Owing to the export market being cut off on account of the impossibility of securing steamer space, an embargo was placed on the importation of apples into Australia in order to protect the home grower. This prevented British Columbia from exporting the usual quantity, which in 1916 amounted to 70,000 boxes, in 1917 to 76,000 boxes and in 1918, owing to the embargo, to only 18,000 boxes.

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which were shipped to New Zealand. Efforts were put forth through the Department of Trade and Commerce to have this embargo removed or modified, but without success as the Australian crop must necessarily be consumed at home.

OTHER MARKETS.

Owing to the reduced acreage of apples in Ontario and Quebec from the causes already noted and from a similar reduction from the same causes in the States to the south, it is not expected, even under favourable conditions, that the crop of apples in Canada or the United States for several years to come will be such as to cause the growers any great concern as to the returns they might receive for their fruit. In preparation, however, for the time when it will be necessary to widen our distribution and increase our export markets, an inquiry was made through the Department of Trade and Commerce as to the possibilities of marketing Canadian apples in the various countries and with special reference to the regulations governing same. All information in this respect has been published in the *Weekly Bulletin* of the Department of Trade and Commerce.

SUGAR SHORTAGE.

With the approach of the small fruit season in 1919 it was evident, from information received through various channels, that there would be insufficient sugar to meet the requirements of the preserving season. As the sugar refiners were then operating under license of the Canada Food Board, this body was immediately appealed to for assistance in obtaining greater quantities to meet the needs of the preserving season. The records of the Board showed that a greater quantity of sugar had been sold than during the year previous, and it was their opinion that wholesale dealers were holding large stocks for increased prices. At the request of the Food Board, therefore, the Fruit Branch made an investigation of the quantities held by the wholesale dealers in the West, where the shortage was most acute, and found that the dealers in no case were holding any quantity, simply enough to meet their immediate needs. As the Canada Food Board was winding up its affairs, the matter was referred to the Canadian Trade Commission and every assistance was rendered that body in their efforts to meet the requirements by means of a more equitable distribution of available quantities. A measure of relief was obtained in this way, but owing to the uncertainty of the supply, wholesale dealers on the prairies would not contract for fruit beyond the visible sugar supply, which resulted in indiscriminate consignments which in many cases brought very unsatisfactory returns to the grower.

In order to prevent, if possible, a repetition of the conditions which obtained last year, efforts were put forth in February to arrange for adequate supplies to meet the needs of the 1920 crop. The only feasible way in which this could be accomplished was by withholding the issuing of export licenses until such time as the home requirements were satisfied, and it was arranged that if, during the period when production might be in excess of the immediate home requirements, there should be a surplus, that fact would be made known to the public, who would be given an opportunity to purchase this surplus to provide for the period when consumption would be greater than production. Housekeepers apparently have realized the necessity of laying in a supply, when available, to meet their preserving requirements, but at the present time there is still some doubt that there will be sufficient sugar to meet all the requirements of the canning season.

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APPLE CENSUS.

As all figures so far published with respect to the production of apples in Canada have been estimates, and as it is very desirable that the actual production should be known so as to enable the producers to form an estimate of the value of their products from year to year, arrangements were made with the Dominion Bureau of Statistics whereby the Fruit Branch would take a census of the apple production in Ontario and Quebec, which would be forwarded to the Dominion Bureau of Statistics for compilation. For a number of years it has been possible to obtain the actual shipments from the provinces of Nova Scotia, New Brunswick and British Columbia, but until the actual production was obtained in the province of Quebec and Ontario, it was not possible in issuing fruit crop reports to give the estimate of the crop for any particular year in a specific quantity. Now that the actual production of apples in Ontario and Quebec has been obtained, it will be possible to state that the crop of any given year is a percentage of the 1919 crop, in terms of barrels or boxes.

STANDARDIZATION OF PACKAGES.

In the practical application of the amendments to the Inspection and Sale Act, assented to May 24, 1918, with respect to standard packages it was found that because of its highly technical character, manufacturers could not meet the requirements without considerable difficulty, and the packages made in accordance with the legislation were not altogether satisfactory to growers and shippers. During the past winter several meetings were held at which representatives of growers, shippers and package manufacturers were present, and the whole question was gone into thoroughly. Sample packages were manufactured and tested, which met with general approval and, in order to obtain the main objective in standardizing packages, namely, that of uniformity, the Fruit Branch has had pattern blocks or forms manufactured in accordance with the approved specifications, from which practically all blocks and forms used in the manufacture of Climax baskets will be made. These changes necessitated another amendment to the Inspection and Sale Act.

TESTS OF KEEPING QUALITIES OF GRAPES.

Owing to the uncertainty of the control of the sale of wines made from Ontario-grown grapes, it was deemed advisable to test the keeping qualities of several varieties with a view to extending the season and widening the markets. In co-operation with the Dairy and Cold Storage Branch tests were carried on during the past winter at the Grimsby Pre-cooling Station with very satisfactory results. The prices received for the sale of the fruit used in making the test, justified the additional expenditure, although it was evident the market would be limited for these in Canada.

POTATO AND ONION CONFERENCE.

While section 337A, of the Inspection and Sale Act, passed in May, 1918, provides optional potato grades, the trade felt that this legislation, passed as a war measure, did not go far enough and numerous requests have been received for the establishment of compulsory grading rules for both potatoes and onions. Before any action was taken, however, it was deemed advisable to call together a small conference in order that the department might learn the wishes of those directly interested in these industries. At our request, therefore, official delegates, about

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thirty in all, were appointed from the various provinces to represent growers, shippers and dealers, and representatives of the consumers and retailers were also present. The Provincial Departments of Agriculture were also invited to send representatives to take part in the discussion and act in an advisory capacity. The meeting was held in Ottawa under the auspices of the Fruit Branch on February 24 and 25 last. In addition to a very full discussion with respect to the defining of grading rules for potatoes and onions, many other phases of the industry were dealt with; and at the close of the meeting the delegates expressed themselves as feeling that a very great stride had been made in the right direction, not only as a result of the resolutions passed, but also on account of the better understanding which would now exist between the producers and handlers of these products.

The advisability of asking that federal legislation be enacted requiring that all potatoes and onions be graded before being offered for sale was approached with some caution on the part of the growers particularly, as there was a feeling of uncertainty as to the measure of control to be exercised, but after a very free and open discussion and as the delegates secured a clearer idea of the measure of control contemplated, it was evident that compulsory grading was heartily approved and a motion was adopted recommending that federal legislation be enacted along that line. The conference also recommended certain designations of grades for potatoes and onions, together with definitions for same. Other matters that were discussed and in regard to which resolutions were passed, were the marking or branding of the containers, the standardization of containers and the unit of weight in the sale of potatoes, onions and other root vegetables. In so far as the latter point is concerned, the conference was unanimous in recommending that the present law be amended and that the unit of one pound be adopted as the basis of all sales. Legislation to meet the wishes of the conference is now being prepared.

MEETING OF CHIEF FRUIT INSPECTORS.

Advantage was taken of the presence of the chief fruit inspectors when attending the Potato and Onion Conference to discuss the work of the branch as a whole, and as affecting each particular district, with a view to obtaining the greatest uniformity in methods of administration, and to discuss ways and means whereby our staff might render a greater service to the fruit industry. It was the general opinion of those present that meetings of this nature should be held at least once a year.

TRANSPORTATION.

The successful transportation of fruit is a complex problem and during the past season was a very important matter. It is becoming more and more evident that as the industry develops wider distribution and further improvements in the transportation service will be necessary. An earnest effort has been made by transportation specialists to render service where the demands were most urgent. The provinces east of the Great Lakes have, during the past season, demanded special attention on account of the many problems arising there.

Numerous complaints have been investigated and, in many instances, adjusted to the satisfaction of the shippers through conferences with railway, express and steamship officials, such conferences being held at points both in eastern and western territory. It has, however, been necessary in the interests of the fruit industry to submit to the Board of Railway Commissioners the following matters in dispute and to appear before the Board in support of same:—

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- (a) Freight rates on fresh fruit from Ontario to points west of Port Arthur;
- (b) Average demurrage plan;
- (c) Heated refrigerator car charges and service;
- (d) Freight and express facilities at Grimsby Beach;
- (e) Cancellation privilege of prepayment of freight charges;
- (f) Adjustment of freight and express rates and routings from Kerencoos, B.C.

It is the policy of the Fruit Branch in its transportation work to promote a better understanding between producers, shippers, consignees and the carriers; to receive complaints of the shippers; investigate and negotiate with the carriers; in brief to perfect as nearly as possible the system of efficient, economical distribution of the fruit and vegetable crops. In this way it has been possible to bring about important changes in the freight and express classifications as well as to obtain favourable consideration from the steamship companies for export shipments.

Assistance has been given shippers in every way possible in securing equipment, and bulletins have been issued from time to time acquainting shippers with tariff privileges and changes. Periodical visits are also made to the producing centres during the shipping season.

The extension of markets has been encouraged by obtaining more favourable rates to undeveloped territories in Canada and in the United States. The transportation specialist also attended meetings of fruit growers in various parts of the Dominion.

An officer was again stationed in Nova Scotia to assist in transportation work, and his services were of great benefit to the shippers in marketing the apple crop during the shipping season. In this connection it was necessary to negotiate traffic arrangements for service to United States points and it required the greatest possible attention in order to keep up a reasonable supply of suitable railway equipment during a period of extreme car shortage.

At the urgent request of the Prince Edward Island growers and shippers of potatoes that the service which was rendered during the fall of 1917-18 be continued, an officer was again stationed at Charlottetown and placed in charge of the distribution of all protected cars there and, by direct communication with the Car Service Department of the Canadian National Railway at Moncton, was enabled to provide a supply of mainland protected cars to meet all potato shipments on the Island railway at transfer points.

INSPECTION WORK.

The inspection service was continued during the past year along the same general lines that have been in force since 1915, when the system of inspection at point of shipment was inaugurated. Owing to the increased production in British Columbia and Nova Scotia some additional seasonal inspectors were appointed, these being returned men, who have given good satisfaction. Special attention was paid to familiarizing growers and shippers with respect to the amendments to part IX of the Inspection and Sale Act, assented to May 24, 1918, but some provisions of which only came into force June 1, 1919. The amendments covering the marking and proper filling of open packages were rigidly enforced during the past season, and the results obtained have demonstrated that this is one of the best pieces of legislation enacted for some years in connection with the fruit industry. Wholesale dealers have frequently commented on the marked improvement in the packing and filling of these packages. This part of the work will again receive special attention during the 1920 season.

The enforcement of section 337A providing optional grades for potatoes has increased the work of the staff, as many inspections of potatoes have been

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made both of ungraded stock and of those actually coming under the provisions of this section.

Wherever violations of the Act have been reported, whether with regard to fruit, fruit packages or potatoes, each case has been thoroughly investigated by the chief inspector for the district in which the offender lived. While many hundreds of violations have been reported during the past season, it was deemed advisable to prosecute in only twenty-five cases, in all of which convictions were secured.

As in former years, the staff has co-operated with the officers of the provincial departments in giving practical demonstrations in improved orchard methods, and by assisting at fruit-growers' meetings. Courses in barrel and box packing have been conducted by the inspectors, and in many cases members of the staff have served as judges at fruit exhibitions.

Wholesale dealers in the city of Montreal having noted the benefits resulting from the standardization of fruit packages, requested that legislation be enacted standardizing blueberry packages and defining grades. It was pointed out that the Inspection and Sale Act, part IX, excludes wild fruit from its provisions and as there are many difficulties in defining grades for such fruits, it was suggested that the dealers should prescribe the dimensions of the packages they preferred, and that the department would then be glad to recommend their use, also to recommend a grade which might improve the industry. Circular letters were sent out to all those interested in the districts from which supplies are received in Montreal, and an inspector was stationed at the shipping point to instruct the shippers in the better methods of preparing their shipments. The results obtained were most satisfactory, and the dealers have again requested that legislation be enacted. As blueberries are shipped in large quantities from the provinces of Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia inquiries were made as to the packages used in each province. It is quite evident that, with the exception of Nova Scotia and New Brunswick, no two provinces are using the same package, but in each case the package now in use appears to meet all the requirements. The Fruit Branch will again this year assist the shippers in the province of Quebec in obtaining uniformity of package and grade.

Owing to the various stages of the ripening and general condition of berries shipped from the lower Fraser valley in British Columbia to the markets on the prairies, which in many instances arrive in a very much decayed condition, a special service of inspection was inaugurated last season whereby the fruit as hauled to the car for loading was graded by one of our inspectors. Where fruit was over-ripe, or where there was a doubt as to its carrying in proper condition to the prairie markets, the berries were sent to the canning factory or to the local market, and only first class, sound fruit was shipped. In all cases the fruit arrived in excellent condition. This demonstration of grading for long-distance shipments will undoubtedly prove of great value to the shippers as it has been clearly shown that it is poor business to pay freight charges and all other expenses on a product which is worthless when it reaches its destination.

On account of the great scarcity of ocean tonnage during the war years, and the embargo on apples entering the United Kingdom, the inspection on the docks at Montreal was unnecessary. This was resumed last season, but the branch has not departed from its policy of inspection at point of shipment. It is, however, still considered necessary to retain our inspection service on the docks at all export points.

INSPECTION STATISTICS.

The following table gives comparative statements of the number of lots inspected and the number of packages inspected for the seasons 1915-16 to 1919-20, inclusive. It should be noted that these figures do not include packages in

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the process of packing, and it is estimated that at least as many more are inspected in this way:—

SEASON 1915-16 TO 1919-20.

Variety.		No. of lots inspected.	No. of packages in lot inspected.	No. of packages inspected.
1915-16.				
Apples.....	Brl.	8,882	710,858	60,248
".....	Boxes	4,297	758,337	46,791
".....	Bskts.	204	14,319	1,797
Pears.....	Boxes	1,062	121,414	8,816
Peaches.....	"	1,022	270,508	12,575
".....	Bskts.	838	106,569	10,796
Plums.....	"	998	482,416	22,231
Tomatoes.....	"	633	200,343	7,926
Small fruits.....	Quarts	1,724	2,670,984	275,234
Grapes.....	Bskts.	260	382,332	11,395
			Total.....	457,809
1916-17.				
Apples.....	Brl.	6,412	404,597	43,359
".....	Boxes	2,337	679,148	32,420
".....	Bskts.	188	14,472	1,332
Pears.....	Boxes	200	108,426	6,108
Peaches.....	"	1,179	289,560	15,612
Plums.....	Bskts.	609	158,133	7,215
Tomatoes.....	"	624	136,993	5,812
Small fruits.....	Pkgs.	2,039	282,365	99,799
Grapes.....	Bskts.	193	273,435	7,951
			Total.....	219,608
1917-18.				
Apples.....	Brl.	5,652	379,496	40,117
".....	Boxes	3,157	908,892	35,888
".....	Bskts.	196	16,146	1,709
Pears.....	Boxes	779	112,717	4,954
Peaches.....	"	1,303	224,228	14,481
Plums.....	Bskts.	773	195,084	5,952
Tomatoes.....	"	652	158,971	6,383
Small fruits.....	Pkgs.	1,312	248,539	14,637
Grapes.....	Bskts.	135	153,027	3,415
			Total.....	127,536
1918-19.				
Apples.....	Brl.	4,861	382,653	36,947
".....	Boxes	2,431	760,307	26,769
".....	Bskts.	122	19,614	1,212
Pears.....	Boxes	576	101,675	4,267
Peaches.....	"	794	242,735	8,806
Plums.....	Bskts.	515	182,286	4,576
Tomatoes.....	"	394	145,113	3,630
Small fruits.....	Pkgs.	852	173,567	11,616
Grapes.....	Bskts.	106	198,336	2,126
			Total.....	99,949
1919-20.				
Apples.....	Brl.	7,026	590,015	46,085
".....	Boxes	4,441	1,240,641	36,353
".....	Bskts.	175	17,544	1,917
Pears.....	Boxes	741	106,199	5,668
Peaches.....	"	1,159	132,444	10,675
Plums.....	Bskts.	715	211,638	6,444
Tomatoes.....	"	816	134,058	9,632
Small fruits.....	Pkgs.	1,670	167,848	24,913
Grapes.....	Bskts.	333	385,602	18,055
			Total.....	159,742

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ENTOMOLOGICAL BRANCH.

The officers of the Entomological Branch have been actively engaged during the year. Investigations on field crop and garden insects, forest and shade tree insects, fruit tree and bush fruit insects, household and stored product insects, live stock insects, as well as insects affecting public health, have been continued. In addition, studies have been made on the natural control of insects and important investigations conducted in developing new insecticides and methods for the control of injurious species. The officers in charge of the field laboratories of the branch in the various provinces are every year becoming more recognized by farmers, fruit-growers and others, as expert advisors in matters relating to insect control.

Under the direction of the Dominion Entomologist the regulations under the Destructive Insect and Pest Act have been administered in so far as these refer to insect pests. The following amendments to the regulations referring to insects were passed during the year.—

By Order in Council dated May 19, 1919, the importation into Canada is prohibited of all corn fodder, or cornstalks, whether used for packing or otherwise, green sweet corn, roasting ears, corn on the cob or corn cobs, from the counties of Essex, Middlesex, Norfolk and Suffolk, in the state of Massachusetts, and also from the counties of Schenectady, Saratoga, Montgomery and Albany, in the state of New York, two of the United States of America. This prohibition shall not extend to shipments of corn transported through the quarantined areas on a through bill of lading. This amendment was passed owing to the danger of introducing into Canada with such importations, the very destructive European corn borer, *Pyrausta nubilalis* Hbn, which has become established in the states mentioned.

By Order in Council dated November 28, 1919, no apple stock of any description, including nursery stock seedlings, scions, buds and grafts, shall be removed from that area included within a radius of five miles of the post office of the town of Wolfville, in the county of Kings, province of Nova Scotia, unless the same is accompanied by a certificate of inspection signed by an authorized inspector, which states that the said stock, seedlings, scions, buds or grafts have been duly treated in accordance with the instructions of the Department of Agriculture and is free from the apple sucker, *Psyllia mali* Schmidberger. This new European pest was discovered in the summer of 1919. The above regulation has been passed in order to prevent its further spread on infested scions, nursery stock, etc.

As consulting zoologist, the officer in charge of this branch, has devoted much study to the conservation of wild life generally in Canada. The economic value of our fur-bearing animals has been given serious thought and methods of protection advised.

DIVISION OF FIELD CROP AND GARDEN INSECTS.

Important studies were made by officers of this division of such insects as the root maggots, Colorado potato beetle, Hessian-fly, white grubs, and other field crop and garden insects. The value of corrosive sublimate for controlling the cabbage root maggot was demonstrated under commercial conditions both in Eastern and Western Canada. Garden and greenhouse insects of various kinds also received the attention of officers of this division.

Serious outbreaks of such field crop insects as cutworms, locusts, western wheat-stem sawfly, beet webworm and potato leaf hopper, occurred in various localities, all of which were investigated and control measures advised.

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DIVISION OF FOREST INSECTS.

The work of this division has been directed chiefly towards problems of bark beetle control in British Columbia, balsam disease investigations in Quebec and New Brunswick, and the development of the system of forest sample plots.

Bark beetle control work in British Columbia consists of modified logging operations so as to destroy the destructive beetles which hibernate in the bark during the winter. Extensive surveys and studies have been made in connection with balsam disease investigations. Insect outbreaks have caused such enormous losses in our balsam pulpwood reserve in Eastern Canada during recent years that the investigation of preventive measures is of the greatest importance.

The development of the forest sample plots is proceeding in a satisfactory manner. We have now fifteen plots established, including over ten thousand trees described and under observation.

DIVISION OF FOREIGN PESTS SUPPRESSION.

This division has to do with the carrying out of the regulations under the Destructive Insect and Pest Act in so far as insect pests are concerned, as well also as the suppression of foreign pests imported into Canada. The work during the past year may be briefly stated as follows:—

Brown-tail moth suppression in New Brunswick and Nova Scotia; inspection and fumigation of foreign nursery and other plant products entering Canada; the establishment and maintenance of quarantines and embargoes against foreign pests; the examination and inspection of nursery stock for export to foreign countries.

DIVISION OF SYSTEMATIC ENTOMOLOGY.

Since the appointment of a definite officer to have charge of the national collection of insects, satisfactory progress has been made in arranging the numerous collections of insects which have accumulated during past years. Large numbers have been classified and placed in their correct systematic position in the national collection which is now assuming very important value and size. During the year a number of prominent entomologists have visited the branch for the purpose of studying our collection. The officer in charge of the collection has rendered assistance in the identification of species to teachers and others interested in insect life.

FIELD LABORATORIES.

Annapolis Royal, N.S. —The officer in charge of this laboratory is also in immediate charge of the insecticide investigations of the branch. During the year he has considerably improved the value of important insecticides particularly applicable to the apple and the potato. Successful orchard and field demonstrations have impressed the growers of the Maritime Provinces of the importance of this work and as a direct result larger and better crops have been grown. Through the studies of our officers at this laboratory in developing improved insecticides it is estimated that important financial savings to fruit-growers and farmers will now result as well as still greater production.

Fredericton, N.B. —The various causes of insect outbreaks have received close investigation at this laboratory. The study of natural control of such important insect pests as the fall webworm, the forest tent caterpillar and the spruce budworm has continued. A report resulting from eight years of study on the former insect is now nearing completion. Important parasites of the

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brown-tail and gipsy moths which were established in New Brunswick and Nova Scotia have been recovered during the year: one important parasite has increased considerably. During the year collections of an important parasite of the western tent caterpillar were made for colonization in Alberta.

Hemmingford, P.Q.—Investigations conducted from this laboratory on the comparative value of liquid sprays and dusts have been continued. Demonstrations in the orchard and in the field have attracted considerable attention. Important orchard insects, such as the apple curculio and the plum curculio, have received special attention.

Vineland Station, Ont.—Life-history studies of the pear psyllia, commenced in 1917, were completed during the year, and valuable data on its control obtained. Investigations on the strawberry weevil and the potato leaf hopper were begun and satisfactory progress made. Experiments with various insecticides on the control of the cherry aphid, apple aphids, onion thrips, tarnished plant bug and blackberry leaf miner, were conducted.

Strathroy, Ont.—The important lines of investigations carried on at this laboratory were the continuation of life-history studies of white grubs and other soil-infesting insects, demonstrations of insecticides valuable for controlling the Colorado potato beetle, and experiments on the control of the potato leaf-hopper. An infestation in western Ontario of the Hessian fly in fields of wheat received attention.

Treesbank, Man.—Owing to a very serious outbreak of locusts in the southwestern sections of Manitoba and southeastern Saskatchewan, the officer in charge of this laboratory devoted the major portion of the summer to visiting locust-infested areas, giving advice to farmers, and demonstrating the value of poisoned baits and other control measures. Outbreaks of other field crop insects, such as cutworms, western wheat-stem sawfly, sugar-beet webworm, etc., were investigated.

Saskatoon, Sask.—The locust outbreaks in this province, like those in Manitoba, necessitated the attention throughout the growing season of the officer in charge of this laboratory. Many farmers' meetings were held and definite instruction given regarding the control of these destructive insects. Our officers worked in close co-operation with provincial officials. As time permitted, investigations were made on insects affecting live stock.

Lethbridge, Alta.—Cutworm studies occupied the attention of the officer in charge of this laboratory. In 1919 a very serious outbreak of these caterpillars occurred in Alberta; in fact probably the most extensive outbreak in the history of the province. Many thousands of dollars' worth of growing crops were destroyed, particularly by the pale western cutworm.

Vernon, B.C.; Agassiz, B.C.; Victoria, B.C.—The officer in charge for British Columbia has made his headquarters at Vernon. From this latter laboratory important investigations in the control of grass, vegetable and fruit tree insects were conducted. At the Agassiz laboratory the natural control of the fall webworm, forest tent caterpillar, and the spruce budworm was studied further. From the Victoria laboratory the main investigations have been on important insect enemies of small fruits.

MOSQUITO INVESTIGATIONS IN BRITISH COLUMBIA.

Under the direction of the chief officer of the branch, a preliminary investigation of the economic importance of mosquitoes in the Fraser valley of British Columbia was undertaken by a special assistant. Life-history studies were made of the various kinds of mosquitoes inhabiting the region investigated. Owing to the importance of this work to the live stock and dairy industry, lumbering industry, small fruit industry, in fact to the public generally, this work is to be continued.

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The following publications have been issued from the Entomological Branch during the year:—

Entomological Bulletins:

No. 16. The Apple Budmoths and their Control in Nova Scotia. By G. E. Sanders and A. G. Dustan.

No. 17. The Fruit Worms of the Apple in Nova Scotia. By G. E. Sanders and A. G. Dustan.

Entomological Circular:

No. 12. Directions for Collecting and Preserving Insects. By J. H. McDunnough.

Crop Protection Leaflets:

No. 11. The date on which it is safe to reseed fields in the Prairie Provinces after they have been devastated by cutworms. By E. H. Strickland.

No. 12. The Beet Webworm. By E. H. Strickland and N. Criddle.

In addition to the above publications the officers of the branch have contributed articles in *The Agricultural Gazette of Canada* as well as in the technical journals, such as the *Canadian Entomologist*. A special report on the Lepidoptera collected by the members of the Canadian Arctic Expedition was prepared by Mr. Arthur Gibson and published in volume III of the Report of the Expedition. Likewise, a report on certain of the Coleoptera brought back by the expedition was prepared by Dr. J. M. Swaine and published in the same volume.

DEATH OF DR. HEWITT.

In the death of Dr. C. Gordon Hewitt, Dominion Entomologist and Consulting Zoologist, the department lost a very able officer. During his eleven years of service he developed the Dominion entomological service from a very small division attached to the Experimental Farms Branch, to an important separate branch of the Department of Agriculture.

THE INTERNATIONAL INSTITUTE BRANCH.

During the year a large number of correspondents were furnished with statistical information on the world's crops and live stock, trade in agricultural products, and prices. A great deal of information was sent to correspondents on agricultural co-operation and rural economy in general, including analyses of legislation passed by the different provinces of Canada. The Government of Switzerland was provided with extensive information on irrigation, rural construction and other rural engineering work in Canada. An inquiry was made as to the work done in the different provinces and agricultural colleges to promote agricultural bookkeeping among farmers. Statistical data, covering all phases of Canadian agriculture, was furnished the institute for use in the "International Year Book of Agricultural Statistics" for 1918. The institute was, as usual, kept informed of everything of interest concerning Canadian agriculture, including the progress of the crops and the results of experimentation.

The Library.—During the year 1,311 bound volumes were added to the library, making a total of 7,633. An average of 749 pamphlets was received every month.

Seven thousand, four hundred and twenty-four cards were received from the Library of Congress and these, together with cards typed in the library, brings the number of cards in the catalogue up to 207,525.

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An average of 932 periodicals was received every month. These include all periodicals indexed in the Agricultural Index. This branch has undertaken to co-operate with the H. W. Wilson Company to the extent of sending them a monthly list of publications of the federal department which are suitable for entry in the Agricultural Index.

Annotated lists of new books received in the library have been sent out bi-monthly to a mailing list of 225 persons.

Valuable accessions include a complete set of the International Catalogue of Scientific Literature, the publications of the Carnegie Institution of Washington, the publications of the Carnegie Endowment for International Peace, etc.

An analysis of the contents of the Library show the following:

Agriculture:

General works.....	7 sections.	Sociology	168 sections.
Bulletins (series.....)	12 "	including—	
Reports of Departments.....	23 "	Sessional papers.....	44 "
Reports of societies.....	8 "	Statistics.....	42 "
Reports of Congresses.....	1 "	Economics.....	23 "
Experiment stations.....	4 "	including—	
U.S. D. A. publications.....	52 "	Land Settlement.....	1 "
U.S. Exper. Stations.....	81 "	Cost of Living.....	1 "
Soils.....	9 "	Dairying.....	7 "
Diseases and pests.....	9 "	Bees.....	2 "
Crops.....	9 "	Hunting and fishing.....	2 "
Fruit and forestry.....	13 "	Veterinary medicine.....	11 "
Horticulture.....	7 "	Home economics.....	6 "
Live Stock.....	22 "	Co-operation.....	7 "
Bibliography.....	13 "	Agricultural credit.....	4 "
Reference works.....	11 "	Science.....	54 "
Periodicals.....	197 "	Landscape gardening.....	1 "

The above table does not include publications on roads, water supply, housing problems, nutrition, geography and history, rural schools, agricultural education, statutes, etc.

The growth of the library has necessitated additional rooms and two more have been allotted—one to be used as a periodical and reading room and the other as an additional stackroom.

One thousand, six hundred and ninety-three publications were loaned during the year. This does not include use of the library by persons who consulted the publications on the premises.

THE PUBLICATIONS BRANCH.

The Publications Branch functions as a connecting link between the federal Department of Agriculture and the farmers of Canada. Among its activities are the publication of the *Agricultural Gazette of Canada*, the preparation and editing of various bulletins, and the distribution of the publications of the department to the regular mailing lists and on request from farmers.

"THE AGRICULTURAL GAZETTE."

The *Agricultural Gazette* presents not only the activities of the federal department but it announces agricultural policies and records the major activities of an agricultural nature in the provinces. During the past year the *Gazette* has come into more prominent view than ever before. At the conference of deputy ministers recently convened in Ottawa a resolution was passed recommending that it continue to fulfil its function, namely, that through it provincial officials might learn what methods and policies were being worked out in the sister provinces and by the federal department in order that duplication of work might be avoided and that the results of experiments might become widely known to agricultural officials.

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MAILING LISTS.

The mailing list of this branch has reached a total of 244,000 names and is divided into seven main subject lists and a number of minor lists. The main lists contain the names of persons desiring publications on field crops, live stock, dairying, poultry, gardening, bees, and tobacco. The names with addresses are embossed on metal stencils from which the entire lists, or any number of them, can be mechanically addressed without duplication. The lists are under constant revision owing to removals, extension of rural routes, and changes of occupation. During the past summer local postmasters in many localities have co-operated in this revision, which has necessitated the cancelling of 29,000 names and changing the addresses of 7,100 persons. Practically 22,000 new names were added and the total envelopes addressed were about 1,688,000. The minor lists include egg producers, seed dealers, drovers, banks, school inspectors, agricultural officials, teachers, and others to whom information is periodically addressed.

In addition to our regular lists we have a number of separate lists sent in by the following branches of the department: Live Stock, Seed, Entomological, Dairy and Cold Storage, and Fruit Branch. There are thirty separate lists containing 16,000 names.

In May, 1919, the Dairy Branch issued its first weekly report, which was sent to a list of 158 English names. When this report was discontinued in December the list then consisted of 420 English and 83 French names. Over 150,000 envelopes were addressed for this list. The Dairy Branch also issued a monthly news-letter to cheese factories, creameries, cheese boards, and those interested in the dairy industry. It was first sent out in October and the list includes about 2,200 English and 2,000 French names. Over 23,800 envelopes have been addressed for this list. The Entomological Branch now sends a monthly news letter principally to members of its staff situated at various points in Canada.

A form letter has been sent out to the secretaries of united farmers' clubs in Ontario, grain growers' locals in Manitoba, Saskatchewan, Alberta, and the secretaries of farmers' institutes in British Columbia, asking for a list of the members in each local. These lists were compared with the names of our mailing lists and those not receiving our bulletins were given the mailing list application card.

DISTRIBUTION.

During the year over 200,000 market reports have gone out to special mailing lists. These reports, prepared by the Dairy and Cold Storage Branch and by the Poultry Division of the Live Stock Branch, are distributed to various producers, dealers, and officials engaged in the production and distribution of these commodities, also to the agricultural press of the Dominion.

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There were distributed from this branch 2,400,000 copies of publications in the twelve-month period. Of these, 2,244,000 were sent to the mailing lists and the remainder in reponse to requests. In the tabulated statement which follows there appears a detailed report of the distribution work of the branch.

	To Mailing Lists.	Requests.
<i>Reports—</i>		
Minister of Agriculture.....	332	260
Agricultural Instruction Act.....	1,025	3,450
Dominion Experimental Farms.....	2,065	1,230
Veterinary Director General.....	2,197	221
Five Monthly Fruit Crop Reports.....	22,725	280
	28,344	5,441
<i>Bulletins—</i>		
Potato in Canada. B. 90 (French).....	51,726	3,460
The Strawberry and Its Cultivation in Canada. No. 92.....	117,946	3,800
The Preservation of Fruit for Home Use. 93.....	4,670	5,050
Farm Weeds. 36 SS.....	140,794	
Flue-Cured Tobacco in Canada.....	1,440	1,020
The Use of Coarse Grains for Human Food. 40 SS.....	8,400	1,120
Summary of Three Years' Experiments on the Tobacco Station at Harrow. 41 SS.....	965	410
A Guide in the Study and Improvement of Plants and Seeds.....	3,155	613
First Canadian National Poultry Conference.....	3,155	410
The Apple Bud Moths and Their Control. (Popular Edition) in Nova Scotia. B. 16.....	4,000	70
The Fruit Worms of the Apple in Nova Scotia. B. 17 (Popular Edition)...	4,000	70
Warble Flies (H. of A.) 27.....	2,372	
	342,623	16,023
<i>Circulars—</i>		
Every Gardener His Own Seed Grower. Part II C. 17.....	198,629	2,220
Directions for Collecting and Preserving Insects. C. 12.....	420	620
The Care of Cream for Buttermaking. D.C. 26.....	865	3,750
Yield and Relative Value of Some Dairy Products. D.C. 27.....	37,346	1,600
The Best Varieties of Grain. C. 16.....	31,076	360
	268,336	8,550
<i>Seasonable Hints.....</i>	753,062	6,230
<i>Market Reports—</i>		
Daily Market Report (Weekly May to December).....	14,607	
Dairy News Letter (Monthly).....	23,802	
Eggs and Poultry Market Report Weekly.....	187,711	
	226,120	
<i>Miscellaneous Circulars—</i>		
European Corn Borer.....	21,645	160
Seed Branch Circulars (32).....	22,712	
Bankers' Competition Circular.....	298,900	
Press Notices.....	22,598	
	365,855	160
<i>Pamphlets—</i>		
Publications Index Book. P. 7.....	865	10,258
Value of Castration and Docking. P. 16.....	2,340	2,360
Policy Regarding Pure Bred Rams. P. 19.....	865	2,770
A Directory of Breeders of Pure Bred Sheep and Goats. P. 17.....	865	950
How to Make and Use Hotbeds and Cold Frames. (French).....	4,097	
Some Varieties of Tobacco Recommended for the Province of Quebec. P. 20 (French).....	2,585	
The Construction and Care of Tobacco Seed Beds in the Province of Quebec. (French).....	2,657	
Tomato and Mushroom Culture and Forcing Rhubarb in winter. P. 22....	6,200	5,800
Cabbage and Cauliflower Culture. P. 23.....	5,892	7,120
Asparagus, Celery, and Onion Culture. P. 24.....	3,707	4,960

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	To Mailing Lists.	Requests.
<i>Pamphlets—Concluded.</i>		
Bean Anthracnose. P. 25.....	112,600	3,900
Melon Culture. P. 26	3,707	6,000
The Cultivation of Some Staple Vegetables. P. 27	3,707	4,800
The Rod Cultivator. P. 28	28,916	4,650
List of Publications.....	8,100	52,000
	187,103	105,568
Reports	28,344	5,441
Bulletins	342,623	16,023
Seasonable Hints.....	753,062	6,230
Pamphlets.....	187,103	105,568
Circulars.....	268,336	8,550
Announcements and Application Cards and Posters	365,855	160
Market Reports and News Letters.....	226,120	
Agricultural Gazette.....	72,679	3,260
	2,244,122	145,232

The whole respectfully submitted.

S. F. TOLMIE,
Minister of Agriculture.

APPENDIX I.

CONFERENCE OF REPRESENTATIVES OF FEDERAL AND PROVINCIAL DEPARTMENTS OF AGRICULTURE.

Held at Ottawa, March 17 to 19, 1920.

In March, 1920, a conference of representatives from the provincial Departments of Agriculture and of the various branches of the federal Department of Agriculture was held at Ottawa in order to consider ways and means of bringing about greater co-operation and co-ordination in the efforts of the federal and provincial departments, to discover means to remedy any overlapping in the work of the two organizations, and in general to discuss plans for the furtherance of the agricultural industry in this country.

All the provinces, with the exception of New Brunswick and British Columbia, were represented, the provincial representatives being listed below:—

Alberta—Mr. H. A. Craig, Deputy Minister.

Saskatchewan—Mr. F. H. Auld, Deputy Minister.

Manitoba—Mr. J. H. Evans, Deputy Minister.

Ontario—Mr. B. Roadhouse, Deputy Minister; Dr. McGillivray, Ontario Veterinary College, (President); Prof. Zavitz, O.A.C.; Prof. W. Toole, O.A.C.; Mr. Hodgetts, Mr. L. Wilson.

Quebec—Mr. A. Grenier, Deputy Minister; Mr. Roy.

Nova Scotia—Prof. Cumming, Secretary for Agriculture.

Prince Edward Island—Mr. Boulter.

Many representatives of the federal Department of Agriculture attended at the conference, which was presided over by Dr. J. H. Grisdale, Deputy Minister, and the following officers took part in the various discussions:—

Experimental Farms Branch—Mr. E. S. Archibald, Director; Dr. F. T. Shutt, Dominion Chemist; Dr. C. E. Saunders, Dominion Cerealists; Mr. W. T. Macoun, Dominion Horticulturist; Dr. M. O. Malte, Dominion Agrostologist; Mr. Jno. Fixter, Supervisor of Illustration Stations; Mr. R. J. Hutchinson, Flax Specialist.

Live Stock Branch—Mr. H. S. Arkell, Live Stock Commissioner; Mr. W. R. Reek, Assistant Live Stock Commissioner; Mr. A. McMillan, Chief, Sheep and Goat Division.

Health of Animals Branch—Dr. F. Torrance, Veterinary Director General; Dr. G. Hilton, Chief Veterinary Inspector.

Seed Branch—Mr. G. H. Clark, Seed Commissioner; Mr. J. Simard, District Seed Inspector for Quebec.

Fruit Branch—Mr. W. Baxter, Fruit Commissioner; Mr. P. J. Carey, Fruit Packing and Orchard Specialist.

Publications Branch—Mr. J. B. Spencer, Editor *Agricultural Gazette*.

Dairy and Cold Storage Branch—Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner.

A programme was prepared covering a number of subjects which it was thought could be profitably discussed, and during the three days which the conference occupied consideration was given to many agricultural questions in which it was thought changes beneficial to Canadian agriculture might be brought about.

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The relation of the work of the Experimental Farms Branch to that of the provincial Departments of Agriculture received a great deal of consideration, as did also the place of the Illustration Stations in the agricultural efforts of each province. As a result a resolution was passed recommending the formation in each province of an Advisory Board, consisting of representatives of the federal and provincial department concerned, who should consider and report upon all schemes for the placing of new Experimental Farms and Illustration Stations in that province, and also upon new lines of work to be carried on. It was considered that the experimental work at present carried on by the various agricultural colleges should not be interfered with, but it was recognized that this should not be extended unduly to conflict with that carried on on the Experimental Farms.

One of the sessions of the conference was taken up with the consideration of ways and means of encouraging young men to enter the veterinary profession in this country. It was pointed out that the outlook in this regard at the present time was not very bright as attendance at the veterinary colleges was decreasing year by year and the Veterinary Director General asked that the provincial departments do all in their power to arouse the interest, as much as possible, of young men from their provinces towards this profession.

The recently inaugurated Accredited Herd System was also discussed and all the provincial representatives promised their active support to the Veterinary Director General in operating this system satisfactorily.

The live stock industry was discussed from all angles with a view to delimiting as far as possible the various phases of this industry which would be considered as part of the work of the federal department and those which could be considered part of the work of the provincial departments. It was agreed that, roughly speaking, all matters in connection with live stock production should be under the control of the provincial departments, while live stock marketing, transportation and kindred phases of the situation should be under the control of the Dominion Live Stock Branch. The Live Stock Commissioner presented a draft policy for the encouragement of the live stock industry in this country which was favourably received by the provincial representatives.

As to the fruit industry it was thought that very little serious overlapping took place between the work of the federal and provincial departments, some few minor details being brought out whereby improvement could possibly be effected.

The Seed Branch outlined a new scheme for the carrying out of what will be known as threshed grain competitions and which will, in some measure, take the place of the old field crop competitions and seed fairs which have formerly been held in the provinces and for which subventions have been received from the federal Department of Agriculture. These recommendations were well received by all the provinces, with the exception of Ontario.

The results that have been achieved by the Fibre Division of the Experimental Farms Branch in fostering the growing of the fibre flax industry in this country were outlined by the chief of that division, and the deputy minister for Ontario (the only province in which this industry is carried on to any great extent) stated that the present method of encouraging this industry was satisfactory to that province.

The provincial deputy ministers promised to appoint some officer in each of their departments to be responsible for providing material for the *Agricultural Gazette* and to act as associate editors for that publication.

The question of the entering of Government-owned stock at live stock shows was discussed at some length and the meeting came to the conclusion that there were no serious objections to such stock being exhibited, provided they had been bred by the department showing them.

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With reference to cow testing, the Dairy and Cold Storage Commissioner said that some of this work was carried on by the provincial departments and the federal department was willing to hand it over to the provincial department entirely when this was considered necessary. He also outlined briefly the work that had already been done and was projected in the grading of dairy produce, especially for export. It was agreed that grading for export was a function of the Dominion department, while the grading for home consumption could be looked after by the provinces.

Other questions considered at the conference were the necessary measures to be taken for the prevention of losses of sheep and calves through the depredations of wolves, dogs and coyotes, and it was decided to get all information on this subject collected and published in a convenient form. The last question discussed was the expected grasshopper plague in the western provinces and the Acting Dominion Entomologist gave an outline of the plan which his branch was recommending.

